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VOL. LIII

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No. 3

ROENTGENOLOGIC EVIDENCE OF PNEUMATIZA- TION OF TEMPORAL BONES IN PRIMATES (GORILLA GORILLA AND CHIMPANZEE AS COMPARED WITH MAN).*

DR. C. C. ROE JACKSON, Cleveland.

The relatively increased use of living Anthropoid Apes for experimental and research purposes, due to their closer phylogenetic relationship and similarity of anatomical detail with man, is indicative of their superiority over lower common domestic animals. It may be that the Anthropoid Apes reared in this hemisphere, in an environment somewhat similar to their native habitat, may show changes, retrogressive or otherwise, in the course of generations. Some of the changes may more closely resemble human anatomical details as we now know them. Conversely, human beings who for generations live in climates similar to the Anthropoid Ape's natural habitat might change to simulate them in pneumatization characteristics.

According to Krogman,¹ the essential relationship of Man and Anthropoid to a common stock remains unchallenged. Man is given a longer period in which to develop and is excused from passing through an Anthropoid ancestry as outlined by the living Anthropoid forms of today. Krogman gives the Dryopithecoids as the basic ancestral stock of Man, Chimpanzee and Gorilla gorilla. The focal point of dispersion is believed to be Central Asia. While Man has taken possession of the Earth and adapted himself to his mental and physical needs, the Anthropoid has failed to adapt much beyond

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its physical needs to survive in one particular climate. The Great Apes, Gorilla gorilla and Chimpanzee, represent survival of two branches whose native habitat is Equatorial Africa. Where the branches, Gibbon and Orang-utan, come off the family tree is somewhat uncertain, but they represent a present-day survival in the tropical areas of Southern China, Malay archipelago and the Island of Hainan. The Gorilla gorilla and Chimpanzee live in the lowland tropical jungle forests of Gaboon and the French Cameroons of West-Equatorial Africa. The Gorilla beringei, a rare species, lives in East Central Africa more commonly at 10,000 feet elevation above sea level. The Orang-utan lives in the low-lying, swampy forests of Borneo and Sumatra, while the Gibbon prefers the uplands to 5,000 feet elevation.

Hofmann² described the gross findings of pneumatization in five Gorilla gorillas as extending throughout the whole temporal bone, even in young specimens, and the tympanic part in the adult. He noticed cells opening into the antrum, into the floor of the tympanum from under the labyrinth, and between the promontory and carotid artery canal, as well as the auditory tube itself. Three Chimpanzee specimens, smaller in volume than the Gorilla gorilla, presented complete pneumatization except in the very young ones in which diploic areas were present beyond the extent of pneumatization. One Orang-utan showed extensive complete pneumatization. Hofmann reported that pneumatization of Anthropoid temporal bones is generally very great but never goes beyond the limits of the temporal bone itself. He believed that the presence of marrow cavities depended on the age and degree of development. In comparing pneumatization of Anthropoid temporal bone with that of the human temporal bone, he believed that the latter showed evidence of being a system in regression.

Hofmann,³ in another publication, expressed the opinion that human temporal bone pneumatization varies more widely than that of the Anthropoids. He indicated that in human beings it appeared to be a rudimentary system, doubtless influenced by pathological conditions, a conclusion expressed by Wittmaack⁴ eight years previously. Wittmaack's theory of pneumatization explains these wide variations from non-arrest to complete arrest, and, were it not for the arresting

factors, our natural course would bring us to a condition of temporal bone pneumatization which would probably simulate the more consistent findings of the Ape material, especially that which has been recovered from the animal's native habitat.

Yerkes⁵ has been unable to furnish us with information regarding the diseases of the Chimpanzee in captivity in sufficient quantity to draw safe conclusions. Except for the Orang-utan and the Gorilla gorilla, it may safely be said that the Chimpanzee resembles Man more closely in its pathology. Yerkes, however, noted from information available that the Gorilla gorilla in captivity is subject to common colds, pneumonia and pulmonary tuberculosis. Practically nothing is known of the diseases of the free wild Chimpanzee. The native habitat of the Anthropoid affords damp, moist greenhouse temperatures and is one of eternal twilight amidst dense foliage, rotting trees and overflowing streams; eight months of the year pitiless, regular rain obscures the sun for days and is relieved only by dense fog.

If some infections of the human respiratory tract respond well to warm temperatures and high humidity, might it not be probable that if this environment anteceded the infection, the infection might not occur? Then, if the greatest arresting factor be assumed to be infections of the ear, and these are eliminated or reduced to a minimum, we might find fewer cases in which arrested pneumatization occurs. Since we cannot produce such a climate for a period of time sufficient to conduct experiments in pneumatization and since research has not yet adequately covered materials living in such a climate, we can at least study the end-result of it on materials brought from such a climate. Human beings seeking their own comfort tend to avoid, if they can, such a climate. The efficient study of Anthropoid Ape materials doubtless will add to the enlightenment of Man and the improvement of his lot.

Although the quantity of Anthropoid Ape material available in various American collections may be limited in volume, it does present certain significant data, provided that the demands of a particular study are not too great and can be confined to dried specimens. The Laboratory of Anatomy of Western Reserve University, according to Krogman and

Schultz,⁶ is the chief source of Gorilla gorilla, and for this study has an adequate number of Chimpanzee, as well as a few Gibbon and Orang-utan specimens. Adult material, permanent dentition complete, was selected in quantity sufficient to make the biological 100 specimens each of Gorilla gorilla and Chimpanzee, no sexual distinction being made. A small number of available Gibbon and Orang-utan specimens are included for additional interest.

The Gorilla gorilla and Chimpanzee used in this study came from the French Cameroons, approximately four degrees north of the equator, and represent materials reaching adult life in their native habitat. It is fair to assume that this represents the end-result of growth and development of a particular anatomical feature as occurs in our nearest Anthropoid relatives in a climate vastly remote from that in which the human material of a previous study⁷ developed and reached its end-result. Roentgenographic examination easily and accurately revealed the desired information, leaving the material intact for future study. A simple basal view was found to be adequate for the purpose of this study and the reason for this will be evident on examination of the illustrations.

Fig. 1, museum specimen No. 1796, is a reduced Roentgenogram of an adult Gorilla gorilla skull. In most cases the mandible was not attached to the skull and this basal view was obtained by elevating the occiput to make it level with the teeth of the maxilla. Familiarity with the basal view of human skulls allows the reader ease of orientation in these plates. The overgrown facial skeleton accounted for by the maxilla and paranasal bones tends to give the skull an elongated appearance. Crests can be seen extending beyond the more densely circular cranial vault itself. At some distance from the cranial vault is the zygomatic arch, which extends back to become part of the temporal bone.

To those familiar with Roentgenograms of temporal bones there readily appears the dense outline of the bony internal ear in the middle of the petrous pyramid, which is one mass of fairly small pneumatic spaces standing out in clear distinction from the cancellous occipital bone and the sphenoid bone with its large sphenoid sinus pneumatization. The outline of the internal carotid artery canal is not easily detected,

owing to the extensive pneumatization and to the fact that it is half the size it is in human beings, thus reducing the comparative density in the immediate vicinity. The outline of the internal auditory canal can be seen better on the left side and the external auditory canal better on the right side in this particular skull. The peripheral ballooning out of the external end of the pyramid makes the external auditory canal much longer than in human beings. The pneumatization reaches to the extreme lateral extension of the pyramid



Fig. 1. Basal view Roentgenogram of adult *Gorilla gorilla*, showing extensive pneumatization of both temporal bones. (Reduced one-half.)

and squama, the zygomatic root and even into the zygomatic arch itself. No amateur could fail to appreciate the tremendous amount of pneumatization that exists in these two temporal bones.

In temporal bones of 100 *Gorilla gorilla*, only one, the left side of specimen No. 1983 (see Fig. 2), showed any alteration from the example illustrated in Fig. 1. This specimen shows a well pneumatized right temporal bone, but the left has a

readily detected difference. Although possibly some pneumatization has occurred over the external auditory canal toward the zygomatic root, it shows almost complete arrest. Since we can find only one out of the 100 of these bones that varies at all from complete pneumatization, we can assume that these animals in their period of growth and development are almost entirely free from arresting factors. Just what



Fig. 2. Basal view Roentgenogram of adult *Gorilla gorilla*, showing arrested pneumatization on left side, no arrest on right side. (Reduced one-half.)

may have occurred to arrest pneumatization in this one temporal bone is a matter of conjecture, since its partner on the opposite side of the skull conforms to the usual pattern seen in the other 99. In a previous study⁷ one 57-year-old human skull showed one temporal bone with complete pneumatization and the opposite one had complete arrest of pneumatization or it became arrested at the birth stage where the process of pneumatization remained stationary. In human beings the arresting factor, in most instances, seems to be inflammatory insults to the mucous membrane of the middle

ear and its adjacent outpocketings. Since the Ape lives in a temperature and humidity that would tend to exclude upper respiratory tract infections almost entirely, the question of trauma in this case might be considered. For example, the animal may have attempted to kill an insect in the canal and injured the drum and infected the middle ear in the act of doing so.

Fig. 3 is a reduced Roentgenogram of an adult Chimpanzee, bearing the museum number 1735. This Anthropoid skull more closely resembles the human skull in that the cranial

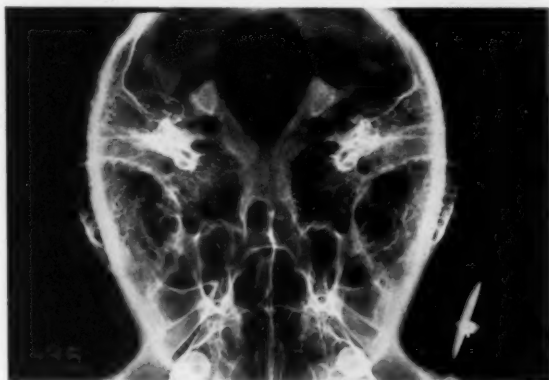


Fig. 3. Reduced basal view Roentgenogram of adult Chimpanzee, showing extensive pneumatization of both temporal bones.

vault is proportionately larger, there is less overgrowth of the facial part. the zygomatic arches are closer to the cranial vault and the temporal bone itself seems nearer the familiar size of the human being's temporal bone. Again there is a narrow, long external auditory canal, a distinct bony internal ear and extensive massive pneumatization in all parts of the temporal bone. Marked posterior expansion of the posterior ethmoid and sphenoid sinuses is worthy of note.

One hundred Chimpanzee temporal bones showed extensive, complete pneumatization, as illustrated in Fig. 3, except the right side in specimen No. 1434, shown in Fig. 4. This particular one shows some arrest of pneumatization, but not complete because some pneumatic spaces can be seen in the root of the zygoma, immediately behind the external auditory

canal and the entire apex of the petrous pyramid. This may give support to the contention that pneumatization originates and proceeds not alone from the immediate vicinity of the mastoid antrum but also may start independently from the anterior part of the tympanic cavity and even the auditory tube itself.

Fig. 5 is a reduced basal view Roentgenogram of an adult Orang-utan skull bearing museum No. 404. Except for the skull characteristics which differentiate it from the Gorilla



Fig. 4. Slightly reduced basal view Roentgenogram of Chimpanzee, showing right temporal bone with marked arrest of pneumatization laterally but a pneumatized apex.

gorilla and Chimpanzee, the picture is quite similar in that the temporal bone shows no arrest of pneumatization. Only four Orang-utan temporal bones were available and all showed no arrest of pneumatization. Though this is a very small number, it helps to show what occurs, at least in part in another branch of the family tree.

Fig. 6, museum specimen No. 654, is a slightly enlarged basal view of an adult Gibbon. The complete pneumatization of both these temporal bones is readily noted. The dense bony internal ear stands out in sharp contrast to its immediate support. In the extent of pneumatization, 36 Gibbon temporal bones showed no deviation from that shown in this illustration. Again, though this lacks the weight of the biological 100 specimens, it may be assumed to represent, in part, the

end-result of time, climate and freedom from arresting factors of still another branch of the family tree.

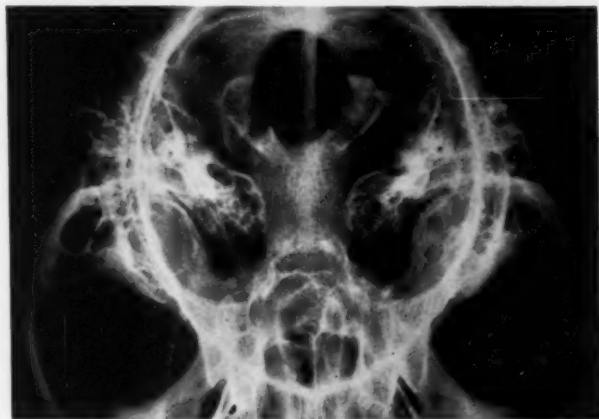


Fig. 5. Slightly reduced basal view Roentgenogram of adult Orang, showing well pneumatized temporal bones.



Fig. 6. Slightly enlarged basal view Roentgenogram of adult Gibbon, showing well pneumatized temporal bones.

In a previous study⁷ of 100 human temporal bones, ranging in age from 55 to 65 years at time of death (end-result

of time, disease, etc.), there were found to be eight which showed no arrest of pneumatization (apex of pyramid pneumatized), 21 well pneumatized except in the apex (medial to internal ear), 56 which showed arrest at or near the two-year phase of pneumatization, and 15 which showed arrest at the birth phase. Contrast with this the foregoing findings of 99 Gorilla gorilla and 99 Chimpanzee specimens showing no arrest and one in each case showing arrest. As Hofmann suggested, human beings certainly have a greater variation in temporal bone pneumatization.

SUMMARY.

1. Presentation of these data adds to the exact and detailed information necessary in the study of Man's place among the Primates. It verifies previous notations and adds the weight of the biological 100 specimens each of Gorilla gorilla and Chimpanzee. The greater the number of different characters which have been considered and the more specimens which have been studied make any classification more reliable and justifiable.

2. Roentgenographic data on pneumatization in temporal bones of 100 adult Gorilla gorilla, of 100 adult Chimpanzee bones, of 36 Gibbon and of four Orang-utan are presented. Only one Gorilla gorilla temporal bone and one Chimpanzee temporal bone showed any arrest of pneumatization. All others showed complete extensive pneumatization of the temporal bone.

3. Compare this with 100 adult human temporal bones of this climate: Eight showed no arrest (99 Gorilla gorilla and 99 Chimpanzee), 21 not pneumatized in apex, 56 arrested at two-year phase, and 15 arrested at birth phase.

4. In regard to pneumatization of temporal bones, human beings who have lived from birth to adult life in the tropics may present findings similar to the Anthropoids of this study. During present war time, many procedures needs must be carried out without the necessary equipment for exhaustive studies. Hence this possibility may be of some service if an ear infection arises amongst local personnel or should those persons be removed to temperate zones where ear infections are more prevalent.

5. It may stimulate a similar study in human material which has reached completion of growth in a humid tropical climate as outlined for these Apes and which may be free of upper respiratory tract infections now assumed to be the great arresting factor in human beings of this climate.

6. After several generations of Anthropoids in captivity, in a temperate climate with more exposure to upper respiratory tract infections, we may find the frequency of arrested pneumatization of their temporal bones to resemble more closely that of the human, and thus tend to confirm or disrupt our contention about the effect of climate and ear infection as being an arresting factor.

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METASTATIC MELANOMA OF THE TONSIL.*

DR. W. LIKELY SIMPSON and DR. DUNCAN G. GRAHAM,
Memphis.

Malignant melanoma is of interest on account of its extremely high mortality and bizarre metastasis. Metastasis has been recorded in almost all parts of the body. Formerly melanomas were considered a form of sarcoma by one group, while another group considered them as a form of carcinoma. Ewing,¹ in discussing melanomas, states that melanotic tumors present wide variations, at times having the structural characteristics of a sarcoma and in other specimens the characteristics of a carcinoma. In this presentation we are using the term malignant melanoma to embrace both varieties of these tumors. In a recent survey of the literature no case of primary malignant melanoma of the tonsil was encountered. An occasional case report of melanoma of the tonsil was found, but upon investigation it proved to be melanotic involvement of the soft palate and not involving the tonsil; however, there were three case reports of true metastatic melanoma of the tonsil: New and Childrey² reported one case of melanoepithelioma in the tonsils. A man 35 years of age had a mole removed from his back five years previously, and eight months before being seen he had nodes in the right axilla. These were removed, with a diagnosis of sarcoma. Both tonsils were involved with a black, scabby process, with the whole tonsil on the left side affected. The tonsil involved was secondary to melanoepithelioma of the left side of the neck.

Lewis³ reported a bilateral melanoma of the tonsils in a white man 42 years of age. The X-ray of the chest showed a large number of small, sharply defined tumors of both lungs. The tumors involving the upper half of each tonsil and of bluish tinge in color, seemed to extend to the body of the tonsils and were ulcerated. There was a history of spitting blood two months. About six months previously, patient had had several electric treatments for a pigmented mole on

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the left side of the neck. Very soon afterwards, pharyngeal symptoms appeared.

Hart and Crawford⁴ reported a case of bilateral metastatic melanoma of the tonsil. A white man 52 years of age was seen on Sept. 28, 1932, with a history of being hit on a black mole on the right ankle with a rock a few months previously. There was a history of a mass on the right thigh a few months after the injury. When seen he had a cauliflower mass covering the entire right tonsil, with a line of demarcation from the tonsil tissue and a small black mass from the crypt of the left tonsil. The tumor was ulcerated. X-ray showed the chest and bony framework normal. The diagnosis was melanotic neoplasm of an extreme degree of malignancy. The patient was treated with X-ray and radium but died in about five months. No autopsy was made.

All three of these patients expired within a few months.

CASE REPORT.

Mrs. T. A., 58 years of age, was admitted to the John Gaston Hospital, July 8, 1942, with a chief complaint of weakness. In May, 1942, patient had daily attacks of hematemesis that continued for about two weeks. She then entered a hospital in St. Louis. A bronchoscopy was done at this time and a positive diagnosis of melanoma was made. A dark pigmented mole was removed from patient's back, July 12, 1941, in St. Louis and the microscopic diagnosis was malignant melanoma. During the past year she had had deep X-ray therapy to her chest.

On admission to the hospital, July 8, 1942, patient was described as an elderly white woman appearing very weak. A purplish-black glistening tumor, which measured about 2 x 3 cm., was seen in the left tonsillar region. There was a generalized cervical adenopathy. July 11, 1942, X-ray of the chest showed multiple rounded densities, varying in size, scattered throughout the chest. The largest of these densities measured about an inch and a half in diameter. Conclusion: Metastatic carcinoma involving both lungs.

On July 14, 1942, we saw the patient in consultation. At that time the findings were as follows: a purplish-black mass, 3 cm. in diameter, was attached to the left tonsil by a pedicle 1.5 cm. in diameter. The mass was freely movable and protruded toward the midline when the mouth was held open. The right tonsil appeared to be normal. The urine was tested for melanin and was found to be positive. Subsequently melanotic particles having the appearance of India ink were observed daily for more than a week in the sputum and in the feces.

On July 16, 1942, under general anesthesia, the left tonsil and tumor were removed without disturbing the attached tumor. The tonsil was of normal consistency. Microscopic diagnosis at that time was melanoma of the tonsil.

On Aug. 1, 1942, a bronchoscopy was done under general anesthesia. A black nodule was seen on the posterior aspect of the left arytenoid, the

size of a match head. A purplish-black mass filled the lumen of the right main bronchus just below the opening of the upper lobe bronchus. A small amount of this mass was removed for study. The microscopic diagnosis was similar to the tonsillar tumor but there was considerably more pigment.

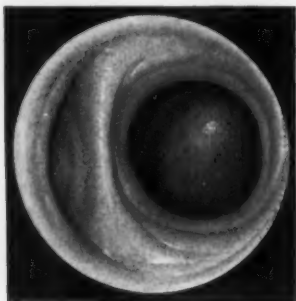


Fig. 1. Melanoma of left tonsil.

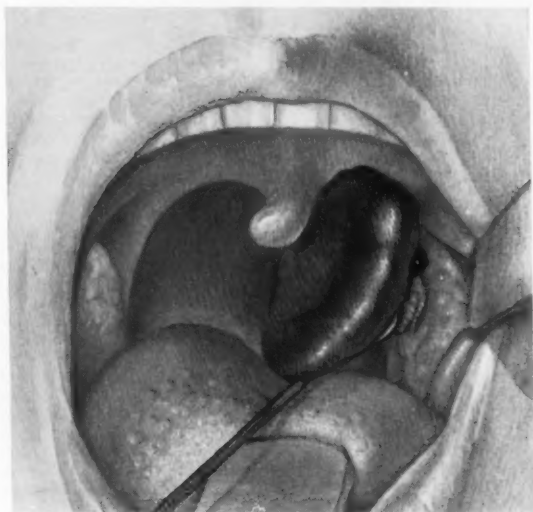


Fig. 2. Melanoma of right main bronchus.

The patient's general course while in the hospital was one of progressive weakness. During the last two weeks before death she had a great deal of difficulty in swallowing. Both upper extremities became markedly edematous. At the time of death, which was Aug. 19, 1942, patient was markedly emaciated and very anemic.

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Autopsy showed malignant melanoma of right bronchus occluding almost the entire lumen; melanoma of the lungs, heart, gastrointestinal tract, spleen, pancreas, adrenals, mesenteric nodes, mediastinal nodes, skin, right tonsil and cortex of cerebrum.

Summary: In a survey of the literature three cases of metastatic melanoma of the tonsil were found and we are adding the fourth. All reported cases were bilateral.

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**PROPYLENE GLYCOL AS A MENSTRUUM FOR
SULFATHIAZOLE WITH PRACTICAL
APPLICATION TO OTOLARYNGOLOGY
AND ORAL SURGERY
(PRELIMINARY REPORT).***

DR. ROGER W. BLACKFORD, Detroit.

In a recent publication, Yonkman¹ and his associates described the use of sulfonamide compounds in a menstruum of propylene glycol. The purpose of this paper is to report the results of the local use of a 3 per cent solution of sulfathiazole in 100 per cent propylene glycol. This discussion includes various types of cases treated in the departments of otolaryngology and oral surgery at the City of Detroit Receiving Hospital.

GENERAL DISCUSSION.

Clinically, the sulfonamide drugs have been responsible for some of the most dramatic results when given orally or parenterally; however, there has been much recent speculation in connection with the local application of these drugs. It is well known that when a high concentration of some of the sulfonamide drugs is desired, the parenteral use of the sodium salts may produce an extensive slough on extravasation. From a clinical standpoint it is desirable, then, to have a preparation that will permit a high local concentration and at the same time produce no local tissue destruction. Yonkman² has shown that "propylene glycol has high solvent properties for sulfonamide (10 per cent), and significantly high properties for sulfathiazole (3 per cent) and sulfapyridine (3 to 4 per cent)." He has also shown that sulfathiazole in propylene glycol is nonirritating, practically nontoxic and

*From the Department of Laryngology, Rhinology and Otolaryngology of the City of Detroit Receiving Hospital and Wayne University School of Medicine, Detroit. The author acknowledges assistance from Dr. Frederick F. Yonkman, Professor of Pharmacology and Therapeutics, Wayne University College of Medicine, Detroit; Dr. James Milton Robb, Chief of Staff of Otolaryngology, City of Detroit Receiving Hospital, Detroit; and Lloyd Rogers, D.D.S., Director of Oral Surgery, City of Detroit Receiving Hospital, Detroit; also from Parke, Davis and Co., Detroit, for supplying the preparation of 3 per cent sulfathiazole in propylene glycol.

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self-sterilizing. These properties are especially desirable in the local application of the drug. The most distressing condition arising from the local use of the powdered drug is the tendency to form irritating clumps that act in every respect like a foreign body. Surgeons find foreign body reactions in cases of compound comminuted fractures of the mandible particularly important to avoid since the tissue shows a marked tendency to slough when there is direct communication of the oral cavity to the outside. The writer has found that propylene glycol containing sulfathiazole can be used generally in large amounts without untoward effects. The exception to this statement was found in its use as an instillation into the tracheobronchial tree in cases of bronchiectasis. Even here there was no evidence of an inflammatory reaction. Propylene glycol is generally known to be a hygroscopic agent and, therefore, the result is an increase in the total volume of bronchial secretion in a given period of time. In the cases studied by the writer, bronchoscopy was done at intervals of seven days.

Since the chemical and pharmacological actions of the sulfonamide drugs and propylene glycol are already known, the writer discusses the subject as related to his experiences with the preparation and reviews several case histories illustrating both successful and unsatisfactory results. These unusual cases were carefully selected because they presented healing problems of such difficult and serious natures that the attending surgeons were all of the opinion that satisfactory results could not be accomplished without extensive surgical procedures. The following case histories are recited to demonstrate the most gratifying clinical results in these very obstinate cases.

PRESENTATION OF CASES.

Case 1: Mr. A. C., a white male, age 42 years, was admitted to the Receiving Hospital to have a facial nerve graft to relieve a paralysis which followed a radical mastoidectomy. At the time of his first operation, the surgeon found many strands of embryonal fibrous tissue which had dissected toward the sinodural angle and downward to the tip and posterior to the region of the facial canal; however, the surgeon was unable to identify the facial canal. The condition resembled a neoplastic change, probably carcinoma of the mastoid, but a biopsy did not reveal the presence of this tissue.

As previously stated, the purpose of the surgeons in the second operation was to attempt a plastic reconstruction of the facial nerve after

the manner of Sterling-Bunell, using a small piece of the intercostal nerve. This, however, was impossible because of the presence of unsuspected pathology in the mastoid cavity. This cavity was exposed in the usual manner. There was no evidence of pus. The labyrinth was thoroughly skeletonized. The entire facial canal area was eroded from about the level of the fenestra ovalis down to the tip of the mastoid. Replacing the bone was a mass of dense tissue of varied descriptions, somewhat suggestive of a teratoma. A mass about the size of a robin's egg, approximately one-half by 1 cm., filled the mastoid antrum. There was no exposure of the middle or posterior fossae. The tip was removed down to the stylomastoid foramen and the facial nerve exposed for a distance of 12 mm. underlying its entrance into the posteromedian aspect of the parotid gland. The nerve appeared well nourished, proximal to the area of the foramen ovale and distal to the stylomastoid foramen. The nerve graft was not done because the destruction of the facial canal, and the facial nerve between the fenestra ovalis and the stylomastoid foramen was so complete that no real bed could be established for a nerve graft. The usual mastoid closure was done.

The laboratory studies revealed a negative Kline test. The urine was negative in all respects. The hemoglobin was 14 gm. per 100 cc. The total red blood cell count was 4,800,000. The total white blood cell count was 9,200 with 70 per cent fl., 25 per cent lymphocytes, 2 per cent monocytes, 1 per cent nonfl. and 2 per cent eosinophiles. The bleeding time and coagulation time were four minutes, respectively.

Biopsy revealed fibrous tissue undergoing recent infection and necrosis. The progress of healing was very slow, and in eight days the postauricular wound broke down completely. Cultures from the cavity did not reveal the presence of organisms. The writer removed the unhealthy granulations and reclosed the wound in the usual manner. Seven days after the secondary closure was made the particular wound broke down again, and there was a rather profuse, chocolate-colored, foul-smelling discharge present. Cultures revealed the presence of staphylococcus aureus. The wound was again freed of all unhealthy granulations and packed open with narrow strips of gauze saturated with 3 per cent sulfathiazole in propylene glycol. In several days the mastoid cavity took on a more healthy appearance. This cavity was kept packed with the sulfathiazole in propylene glycol preparation. The patient returned to the out-patient clinic for further treatment and observation for a period of six months. No other preparations or types of therapy were used. At the end of that time healing was complete and there was only a slight cosmetic defect behind the pinna.

Case 2: Mrs. T. H., age 39 years, was admitted to the hospital with the history of having had a sore nose for eight months and a destructive lesion of the nasal septum and upper lip for only two weeks previous to her admission. Examination revealed the nose to be red and indurated, with flattening of the bridge and almost complete destruction of the septum. Biopsy revealed granulation tissue, either syphilitic or tuberculous. On admission the Kahn and Kline tests were negative. The patient was given iodides, bismuth and mapharsen. One week after the first dose of mapharsen, blood serology was shown to be positive. All other laboratory findings were normal. A diagnosis of gumma was established.

Local application of 3 per cent sulfathiazole in propylene glycol was used on the upper lip and five drops of the same preparation were applied to each side of the nose three times daily for a period of one week before antileptic treatment was begun. Cultures revealed staphylococcus aureus. Cultures were negative for tuberculosis and fungi. Secondary infection was completely controlled and complete healing took place in four weeks without incident. This seemed to be an unusually rapid repair, considering the severity of this lesion. The patient was referred to the board of health for further antileptic treatment.

Case 3: Mr. J. McF., a colored male, age 24 years, was admitted to the hospital with the history of having been stabbed with a large hunting knife. The knife pierced the outer table of the frontal sinus, the superior orbital ridge of the left eye, cutting the eyeball in half, the lateral wall of the orbit, the left maxillary sinus, and the point lodged in the root of the left zygoma. The blade of the knife, which measured 13 cm.



Fig. 1. Case 3, J. McF.

(A) Patient showing position of knife blade on day of admission to the hospital.



(B) Anteroposterior Roentgenogram showing the knife blade passing through the left frontal sinus region, left orbit and left zygomatic region.

in length, was removed without incident. Following the extraction of the knife, hemorrhage was profuse and was controlled with ligatures. The supraorbital wound and the orbit were irrigated with normal saline and later with 3 per cent sulfathiazole in 100 per cent propylene glycol. The left eye was enucleated in the usual manner and the supraorbital



(C) Lateral Roentgenogram showing the passage of the knife blade through the left frontal sinus region, the left orbit, and the entrance of the point of the blade in the left antrum.



(D) Anteroposterior Roentgenogram showing a glass eye in the left orbit and a slight cloudiness in the left ethmoid labyrinth.

wound closed in layers. Following the enucleation by Dr. W. D. Knapp, the author made an antral window in the left maxillary sinus and irrigated the antrum with 3 per cent sulfathiazole in propylene glycol; also, 5 cc. of the same preparation were injected and left in place. Because of severe nasal hemorrhage, both sides of the nose were packed tightly with 1 in. iodoform gauze.

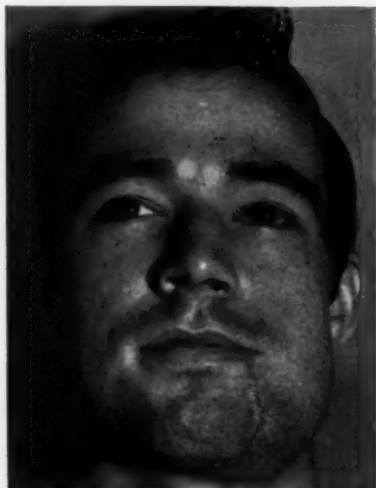
The laboratory findings were normal. In seven days recovery was complete and without complication. The patient was seen at regular

intervals in the out-patient dispensary and to date there have been no residuals.

Case 4: Mr. J. E., a white male, age 20 years, was admitted to the hospital and was found to be in a state of shock. The history as given by another person revealed that the patient had been thrown forcibly to the pavement in an automobile wreck. The car allegedly was traveling at a high speed when the patient fell out the door and was thrown under the back wheel. He was taken to the nearest physician, who gave him



A.



B.

FIG. 2. Case 4, J. E., compound fracture of the mandible.

(A) Patient before operation.

(B) Three weeks after operation, showing complete healing.

morphine $\frac{1}{4}$ gr. and 1,500 units of ATS and sent him to the Receiving Hospital. The writer, who first saw the patient about six hours later, found him not only in a state of shock but also with severe compound comminuted fracture of the mandible and extensive lacerations of the chin and neck. The rectal temperature was 102.4°, pulse 110 and respirations 20 per minute.

The patient was treated for shock and was given 500 cc. of blood plasma at once. In several hours his condition was sufficiently improved so that he could be taken to surgery.

After the usual preparation of the face and neck, a thorough debridement was done. Numerous fine spicules of bone and many particles of dirt were removed. A 3 in. fragment of the left mandible was found to be unattached at its mesial end and lying in the soft tissue, while the distal end pointed outward. This fragment was partly covered with dirt from the road. All foreign matter was carefully removed from the fragment of the left mandible. The wound was then thoroughly irrigated with normal saline and the oral cavity was carefully inspected for spicules of bone, loose teeth and tooth fragments. Two or three spicules of bone were removed. An upside-down molar tooth was found but was not removed until two days later. The unattached fragment of the mandible was then replaced in the oral cavity by the oral surgeon, who tried to approximate the fragments. The wound was then irrigated with 90 cc. of 3 per cent sulfathiazole in propylene glycol and closed in layers in the usual fashion. The tightly sutured wound was then painted with 1 per cent gentian violet and brilliant green to control secondary infection. A large sterile dressing was applied and held in place with a Barton bandage. Sodium sulfadiazine was administered intravenously. During the first nine days a total of 142.5 gr. was given. Each dose was given in 100 cc. of sterile distilled water. The initial dose given on the first day was 30 gr. This was followed by a second dose of 15 gr. All other doses were given as follows: sulfadiazine gr. $7\frac{1}{2}$ twice daily, except on the seventh and eighth days, when a single dose of 15 gr. was given. On the tenth day the upper and lower jaws were immobilized with an interdental splint. X-rays were not taken at the time of admission because of the serious condition of the patient and the possible fracture of the cervical spine. Two days later X-rays were taken. The report read as follows: "There is considerable separation of the fragments. This also involves the anterior portion of the lower jaw. The lower left molar is involved in the fracture and is turned upside-down. The fragments are not in good position. There is no apparent fracture of the cervical spine." Further X-ray studies at intervals of 10 days showed the fragments to be in good position and with an apparent beginning union.

The laboratory studies revealed negative Kahn and Kline tests. The hemoglobin was 12 gm. per 100 cc. The total white blood cell count was 12,250, with 87 per cent neutrophils and 13 per cent lymphocytes. The total red blood cell count was 4,410,000. The color index was 0.85. The urine was negative in all respects. Four days after admission the hemoglobin was 11.5 gm. per 100 cc. The total white cell count was 9,100, with 75 per cent neutrophils, 23 per cent lymphocytes, 1 per cent eosinophiles and 1 per cent basophiles. Sulfadiazine levels over a period of 10 days ranged from 0.72 mgm. to 3.9 mgm. The urine at this time had a trace of sugar, apparently due to the intravenous glucose, as the patient was given an intravenous of normal saline (1,000 cc. plus 5 per cent glucose) for two days and then again on the ninth day.

CONCLUSIONS.

The writer has reviewed only a few typical cases in which the preparation of 3 per cent sulfathiazole in 100 per cent

propylene glycol has been used and only cases of such extreme severity that the attending surgeons felt would not heal without extensive surgery. The results obtained from the personal administration of the preparation on the many and various types of cases treated in the departments of otolaryngology and oral surgery at the City of Detroit Receiving Hospital during the year 1941-1942 have brought out the following conclusions:

1. A 3 per cent solution of sulfathiazole in propylene glycol when used locally is nonirritating and nontoxic.

2. The preparation can be used generally in large amounts without untoward results. The exception to the above statement was found in the cases in which the preparation was instilled into the tracheobronchial tree via the bronchoscope. The unsatisfactory results were due to the hygroscopic action of the drug rather than to any visible evidence of irritation or toxicity.

3. In cases of compound comminuted fractures of the mandible this preparation seemed to give high local concentration of the drug and to eliminate the possibility of a foreign body reaction.

4. The preparation proved valuable in controlling secondary infection. The writer has found the preparation particularly effective in controlling infection in deep penetrating wounds or in crushing wounds where debridement is necessary. This preparation was also of particular value in the case in which there was an extensive destruction of the nasal septum. The preparation aided in preventing infection of a traumatic case involving the paranasal sinuses. Further experimentation, however, should be done in regard to the effect of this preparation on the ciliary action in the nose before any definite conclusions as to the advisability of using it extensively in acute upper respiratory infections can be drawn.

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RHINOPHYMA; WITH NEW ETIOLOGIC AND THERAPEUTIC CONSIDERATIONS.*

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Rhinophyma is a condition in which there is a chronic hypertrophy of the cutaneous and subcutaneous tissue of the nose with resultant lobulations and disfiguring enlargement. This hypertrophy usually involves the lower half of the nose and is resilient to palpation. In rare instances the chin may also be involved.¹ As the result of this hypertrophy, the glandular openings are large, vascularity is greatly increased, imparting a purplish-red color. The enlarged gland ducts contain a considerable amount of an oily, semisolid, sebaceous material which is easily expressed on the slightest pressure. The flush areas of the face usually exhibit a tendency to seborrheic dermatitis with acne-like lesions and telangiectasia. The pustular lesions seen on the face are similar to those observed in ordinary acne, except that the suppuration is slight and close to the surface. The papules and nodules about the nose are definite tissue indurations. As a rule, there are no subjective symptoms except when seborrheic dermatitis complicates the picture, when itching is present.

A review of the literature for the past 20 years reveals about 60 cases of rhinophyma,^{2,3,4} of which only two were in women.^{5,6} Several instances of malignant degeneration were also noted.^{7,8}

All cases of rhinophyma mentioned in the literature were reported to have resulted from a chronic acne rosacea; therefore, the commonly accepted predisposing cause of this disease is that rhinophyma is the terminal stage of a chronic acne rosacea. The excessive use of alcoholic beverages was repeatedly mentioned as an exciting cause, although numerous cases were reported in total abstainers. Rhinophyma has also been attributed to the fact that the nose is a constantly exposed surface. Enlarged pores, the excessive use of tea

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and coffee, and congenital predisposition have also been mentioned as causes.

The clinical picture is reflected in the histopathology. The superficial layers of the skin are inflamed. There is an increase in the number and size of the sebaceous glands and fibrous tissue of the nose, distending the overlying dermal tissue, resulting in an abnormal enlargement. Leucocytic infiltration incident to infection may also be present.

Various forms of therapy including diathermia,^{9,10} desiccation,^{11,12} coagulation^{13,14} and radium or Roentgen irradiation



Fig. 1. Before surgical intervention.

tion¹⁵⁻¹⁸ have been employed. With these methods there was often an excessive destruction of tissue resulting in severe scars, distortion of the nasal tip and sometimes even necrosis of the alar cartilages.¹⁹

Optimal results were obtained by surgical intervention by paring off the redundant tissue with a razor.²⁰⁻²⁸

CASE REPORT.

Mr. F. N., age 57, was referred by his attending physician with a diagnosis of rhinophyma, for plastic correction. A careful history revealed that this condition had its onset five years ago and was preceded by a chronic acne rosacea and severe seborrhea of seven years' duration. He stated that during the past two years there was no further enlargement. This condition had caused the patient considerable embarrassment and

made him reclusive. An investigation of dietary habits showed that the patient had always avoided alcoholic beverages and imbibed very little in tea and coffee, although he showed a preference for highly seasoned foods. The diet was noticeably deficient in vitamin C for years. Six months previously, because of gingivitis, all his teeth were extracted. The nose conformed to the typical description of rhinophyma (see Fig. 1). Other physical findings were negative except for badly infected tonsils. Tonsillectomy was performed and an autogenous vaccine was administered by his physician. The infected lesions about the nose began to subside somewhat with some fading of the flush areas of the face, which caused the nose to appear relatively smaller; however, the vaccine therapy probably had little influence on the rhinophyma, per se. Incidentally, the vaccine therapy completely ameliorated a neuritis in both legs, of

TABLE I. PATIENT N.
LABORATORY FINDINGS IN A CASE OF RHINOPHYMA.

	4 Days Preoperatively	4 Days After Therapy†	82 Days Postoperatively*
Calcium	11.4 mgm. per 100 cc.	.....	11.6 mgm. per 100 cc.
Inorganic Phosphorus	3.2 mgm. per 100 cc.	.....	3.5 mgm. per 100 cc.
Cholesterol	210.0 mgm. per 100 cc.	.....	195.0 mgm. per 100 cc.
Lipoid Phosphorus	16.5 mgm. per 100 cc.	.....	12.2 mgm. per 100 cc.
Ascorbic Acid	0.42 mgm. per 100 cc.	.....	1.26 mgm. per 100 cc.
Hemoglobin	12 gm.	12 gm.	.....
R. B. C.	5,000,000	.....	4,540,000
Color Index	0.85	.....	.....
Platelet Count	380,000	.....	425,000
Sedimentation Rate	18 mm. in 1 hour	.....	14 mm. in 1 hour
Coagulation Time	7 min., 55 sec.	3 min., 45 sec.	2 min., 53 sec.
Clot Retraction	.....	.....	.....
Time	24 hr. +	.....	1 hr.
Bleeding Time	9 min., 30 sec.	1 min.	1 min., 8 sec.
Prothrombin Time	39 sec.	.....	21 sec.
Plasma Coagulation	.....	.....	.....
Time	307 sec.	.....	176 sec.
Capillary Fragility	112 petechiae	48 petechiae	12 petechiae

†Koagamin, Koaginol and ascorbic acid.

*Patient on 50 mgm. ascorbic acid daily, fruit juices and adequate vitamin diet.

Koagamin is an aqueous solution of oxalic and certain related dicarboxylic acids. Koaginol is an oil solution of the ethyl esters of these dicarboxylic acids.

many years' standing. Local treatment such as ordinarily prescribed in rosacea was employed and continued until the patient could arrange to submit to surgical intervention.

Accordingly, the patient was admitted to the St. Joseph's Hospital on July 20, 1941. On account of the profuse bleeding encountered,^{27,29} the services of Arthur Steinberg were solicited to carry out hematological studies and to determine the possible existence of a predisposition to hemorrhage. Extensive laboratory studies were performed, and the results are depicted in Table I.

A diagnosis of subclinical scurvy was made.

The patient was prepared for operation by a preliminary course of ascorbic acid administered intravenously, 200 mg. daily. Because a predisposition to hemorrhage was revealed, it was deemed advisable to administer an effective hemostatic to minimize this danger.

The writer has utilized the coagulant preparation Koagamin in over 100 cases of reconstructive and reparative surgery with excellent success

in promoting hemostasis. These cases will be reported in detail in a subsequent publication. Koagamin is an aqueous preparation of oxalic and malonic acids, which may be administered either intravenously or intramuscularly. Its use in preventing and controlling hemorrhage has been reported by many investigators.³⁰⁻⁴⁰ Koaginol is an oil preparation of the diethyl esters of dicarboxylic acids, which is administered intramuscularly, and is of advantage because of its sustained action. Because of the predisposition to hemorrhage in this case, Koagamin was employed, with similar effectiveness. One hour preoperatively the patient was given 1 cc. of Koaginol intramuscularly, and immediately preoperatively he received 3 cc. of Koagamin intravenously and 2 cc. intramuscularly. The clotting time at operation was reduced by 50 per cent.

The operation was performed under local anesthesia by infiltration with 1 per cent novocaine and 1:20,000 adrenalin. The nares were packed to

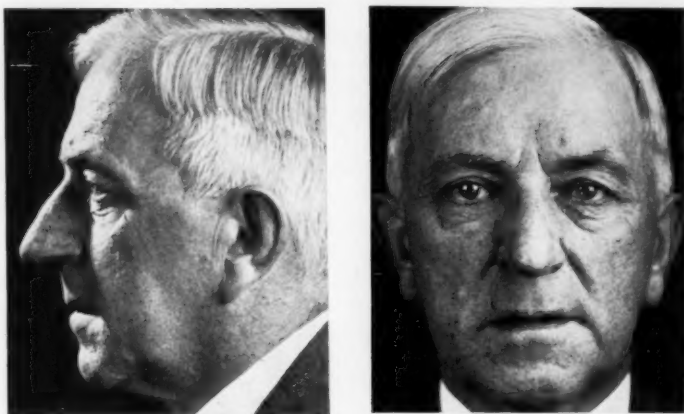


Fig. 2. Postoperative views, almost a year later.

prevent the patient from swallowing blood during the operation. The rhinophyma was pared down with a razor until the nose assumed a normal contour. Due to the marked vascularity of the tissues, there were a considerable number of bleeding areas which were less distressing than had been anticipated. Most investigators have advocated the use of hot local applications during the operation to control the bleeding. The author, however, has initiated the use of cold compresses because of the vasoconstrictor action of the latter. At the completion of the operation firm blood clots had formed. There was no postoperative bleeding. The nares were packed with fresh gauze over which was applied sterile vaseline strips and then sterile gauze. A previously prepared molded metal splint covered the dressing to afford pressure. This was held in place by a web strap fastened around the head and was found unnecessary after the first week. Dressings were changed every other day. During the period of convalescence, fresh fruit juices and a well balanced diet, adequate in vitamins, was prescribed. Epithelialization was complete within five weeks despite the existence of a vitamin C deficiency. Low dosage X-ray irradiation for the seborrhea was subsequently given.

The alteration in physiognomy was only surpassed by the alteration in psychic behavior of the patient. (see Fig. 2). It is noteworthy that

there was a personality change from that of a reticent individual with an inferiority complex to one with sociable and amiable manner. There has been no evidence of recurrence in the one year postoperative follow-up. The patient has been enjoying a continued sense of well-being.

The etiology of rhinophyma is obscure. All cases of rhinophyma reported in the literature were said to have resulted from a chronic acne rosacea. This is generous testimony that rhinophyma is always secondary in nature, engrafted upon a specific pre-existing disease. It is difficult to fathom why rhinophyma is almost solely restricted to males, when the parent disorder (acne rosacea) is three times as frequent in females.⁴¹ Because of its insidious onset, the ferreting of the cause is made more difficult.

There is much reiteration as to the rôle of alcohol as an exciting cause of rhinophyma, but a paucity in clinical evidence; in fact, the condition is frequently referred to as a "rummy nose." The case reported herein, as well as numerous others cited in the literature, were total abstainers from alcoholic beverages. In a survey made by the author, over a period of many years, in the region of Philadelphia, which abounds in habitual drunkards, only an occasional case was observed. The other exciting causes previously mentioned must be discounted because of the lack of confirmatory evidence.

Acne rosacea may be incidental rather than causative of rhinophyma. It may be that the causative agents of acne rosacea and rhinophyma are the same. Since rhinophyma is most common at about the fifth decade, it may be that the condition is allied to the alteration in the elaboration of the sex hormones, principally androgens, which occurs at this time. It has been demonstrated that the administration of these androgenic substances has stimulated the sebaceous glands and produced typical acne in males and even in females.⁴² Furthermore, it has been recently shown by Hamilton⁴³ that acne is rare in eunichoid individuals where there is a diminution in androgen output and that when certain of these patients receive testosterone therapy, acne and seborrheic dermatitis develop. It is possible that during the period of life when the male is approaching the climacteric there is a sudden abnormal gonadal stimulation with an attendant increase in the output of androgens which precipitates the

onset of rosacea and sebaceous gland hypertrophy which may, in a small percentage of cases, be so great as to culminate in a rhinophyma. Even after the androgen secretion diminishes the resultant pathology may not always be reversible; however, it may be that in the case of a rhinophyma where there is a hyperactivity of the sebaceous glands, the latter continues unabated, despite the withdrawal of the stimulus. *It should be realized that the author is merely offering this as a more satisfactory explanation for consideration.**

Dietary disturbances should not be overlooked as it is not uncommon for individuals at this age of life to be utilizing deficient diets. Many of these individuals select a restricted diet for themselves to avoid gastric upsets and other untoward symptoms, as did the case described herein, who developed signs of subclinical scurvy. The pyorrhea alveolaris which previously existed in this case and necessitated the extraction of all his teeth may have been due to this latent scurvy. It is well known that in vitamin C deficiency, gingivitis with loosening of the teeth is commonly observed. The seborrhea encountered in this patient may also be linked with the vitamin C deficiency in which there is a predisposition to infection.

Lanman and Ingalls⁴⁴ have shown that in vitamin C deficiency, wound healing is protracted but is offset by the administration of ascorbic acid. It is possible that normal healing processes were assured in this patient because of the adequate administration of ascorbic acid.

In view of the above evidence it might be well to pursue this line of investigation further, regarding the relationship of vitamin C deficiency to rhinophyma and the relation with male sex hormones. No observations of this nature have been previously reported.

The author is extremely grateful to Arthur Steinberg, of the Hematological Research Laboratory, for suggesting and carrying out the laboratory studies and for his collaboration in the etiological considerations.

The employment of a double-edged safety razor blade, on a suitable handle, greatly facilitated the operation. This instrument pared the tissues with ease as compared to the straight razor. For this valuable suggestion, the author is deeply indebted to the Supervisor of the Operating Room, Sister Bernadette.

*Further studies are indicated in determining the etiologic significance of androgens in relation to rhinophyma.

SUMMARY.

1. A survey of the existing etiologies and treatments of rhinophyma was given.
2. A detailed report of a case of rhinophyma was presented with hitherto unpublished laboratory findings and correlations.
3. Vitamin C deficiency and a predisposition to hemorrhage were observed.
4. The etiological findings previously reported were absent in this case.
5. The patient was prophylactically treated with vitamin C, Koagamin and Koaginol, which minimized bleeding during operation and prevented postoperative hemorrhage.
6. The surgical technique was described utilizing an ordinary double-edged safety razor blade.
7. Ice cold packs were employed in this procedure instead of hot applications as advocated, which produce vasodilatation.
8. The possible causative rôle of the sex hormone and vitamin C deficiency in the etiology of rhinophyma is discussed.
9. Beneficial results were obtained with the procedure described.

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2123 Pine Street.

SARCOIDOSIS OF THE LARYNX (BESNIER-BOECK-SCHAUMANN DISEASE).

DR. JOHN J. SHEA, Memphis.

Sarcoidosis is a disease of the reticuloendothelial tissues manifested by the formation of granulomas. The dermatological literature is rich with many monographs upon the subject, but only a few meager reports of laryngeal manifestations are to be had in laryngology. Recently Poe¹ reported an interesting incident of sarcoidosis of the larynx and quotes Pinner² as mentioning one American and two foreign cases, the former by Longcope and Pierson.³ The characteristic lesion is a hard epithelioid tubercle containing Langhan's giant cells. There has been a constant and interesting discussion as to the part played by the tuberculous bacillus. If the condition is tuberculosis, the larynx should be a favorable region for the disease and yet the case to be reported is the fifth in the available literature.

Besnier⁴ in 1889 reported a patient with granulomatous swellings of the ear, nose and fingers, though many years before, Hutchinson^{5,6} had reported a similar condition upon the legs and fingers but failed to name it. Ten years later Boeck,⁷ after studying the microscopical characteristics of the disease, named it "sarcoid" because he considered that the predominating cells resembled the small cells of sarcoma. Further study of the disease influenced him to believe that the condition was infectious and related to tuberculosis.^{8,9} Kienbock,¹⁰ Kreibech¹¹ and Rieder¹² are credited with contributing the Roentgenological knowledge that in sarcoidosis there develops curious cysts of the bones of the digits.

ETIOLOGY.

The morphology of the microscopical picture of a typical sarcoid nodule resembles a tubercle, but the failure to isolate the tubercle bacillus in the biopsy has led to endless controversy. Schaumann¹³ contended that the organism was of the bovine type. Pullinger,¹⁴ et al., contended that the reticular

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response was comparable to Hodgkin's, while Kissmeyer and Nielsen¹⁵ considered it a virus infection similar to a chronic infectious granulomatosis.

PATHOLOGY.

The pathology is that of a granuloma with tuberculoid accumulation of lymphoid cells and a scattering throughout

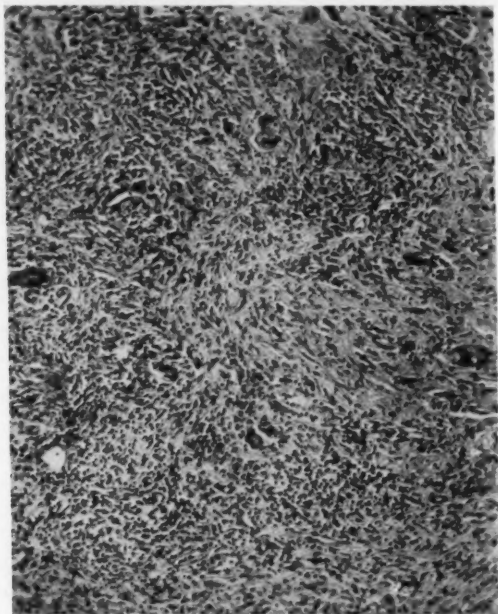


Fig. 2. A photomicroscopic showing Langhan's giant cells circumscribed by epithelioid cells typical of sarcoidosis.

the lesion of giant cells of Langhan's type. The absence of necrosis or caseation makes of it a hard tubercle. Healing may occur through fibrosis. The surface epithelium covering the nodule does not ulcerate and there is a marked absence of polymorphonuclear leucocytes.

CASE REPORTS.

L. W., a negress of 32 years, was referred for the relief of hoarseness of four months' duration. There was nothing unusual in her past history. Her present occupation was that of a domestic. The onset of the hoarseness was gradual and without cough. The family physician of her

employer, while making a physical examination to determine the cause of her hoarseness, discovered an enlargement of the right half of the larynx. Her temperature was normal, as likewise a study of her lungs. The Wassermann test was reported negative on two different occasions. The examination of her nose and throat failed to reveal a lesion of the skin or mucous membrane similar to those reported elsewhere. A direct examination of the larynx revealed an upward displacement of the right vocal cord by a fleshy mass, which extended downward into the trachea.

Biopsy: Through a laryngeal fissure, the tumor was exposed. The mucous membrane covering it was clean, smooth and benign in appearance. The tumor appeared to be part of the lateral cartilaginous wall of the larynx. The vocal cord was not involved. A window was made through the cartilage to obtain the specimen, thus avoiding an open wound on the laryngeal surface of the tumor. The pathological report was "microscopically the lesion is composed of dense fibroblastic tissue. Circumscribed areas containing epithelioid cells and Langhan's giant cells are rather sharply outlined. There is a dense lymphocytic infiltration surrounding these areas. Some necrosis has occurred in the more superficial areas. Diagnosis: Boeck's "sarcoid." (Laboratory report No. 63776, dated Aug. 16, 1940, Baptist Memorial Hospital, Memphis.)

Progress: The patient has been observed for the past two years and the lesion has receded but remains as a subglottic enlargement. The hoarseness is less noticeable, but persistent.

TREATMENT.

Supported measures, tonics and improvement of the living conditions of these patients constitute the accepted therapy for sarcoidosis.

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1018 Madison Avenue.

PARALYSIS OF THE RIGHT VOCAL CORD.

DR. JOHN J. SHEA, Memphis.

The most common cause of paralysis of a vocal cord is a surgical accident usually in the performance of a thyroid operation. The left cord, being innervated by the left recurrent laryngeal nerve, is more frequently paralyzed than its mate, the right cord. The reason for this is that the left recurrent nerve is longer and through its relationship with the arch of the aorta is vulnerable to pressure, especially by aneurysm of the arch. Both nerves are accessible to pressure from malignant thyroids which impinge the nerve back against the esophagus. The right recurrent laryngeal nerve "leaves the trunk of the vagus as the latter passes over the anterior surface of the subclavian artery; there it curves to the undersurface of this vessel and then continues upward and inward to the groove between the trachea and esophagus, along which it ascends to the lower margin of the thyroid cartilage. It finally enters the larynx behind the articulation of the thyroid and cricoid cartilages and beneath the lower border of the inferior constrictor muscle" (Barnhill, John Finch: *Surgical Anatomy of the Head and Neck*. 2nd Ed., 69. Williams and Wilkins Co., Baltimore). Aneurysms of the right subclavian are rare and the experience of seeing two within the period of a year deserves reporting.

A. F. C., male, aged 45, was referred for an opinion as to the cause of hoarseness. The impairment to his voice had been gradual for the past month, without any acute respiratory infection.

Examination of the nose and throat was negative. The tonsils were surgically absent and the right antrum was acutely involved. Indirect inspection of the larynx revealed a complete paralysis of the right vocal cord. There was a pulsating enlargement visible in the right subclavicular region, which on palpation had a vascular pulsation.

A Roentgenological examination of the chest was reported as showing considerable enlargement of the heart, with widening of the ascending, transverse and descending limbs of the aortic arch, the appearance being that of a hypertensive heart disease. Chronic congestive changes were visible in each lung field, being most dense in the hilar areas. No definite aneurysm was observed in the arch. There was a slight increase in the size of the superior mediastinal vessels on the right side of the mediastinum which extends upwards into the neck.

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The Wassermann reaction was negative. The aneurysm of the subclavian apparently is the cause of the paralysis of the right vocal cord.

Case 2: E. H. B., male, aged 62, was seen suffering from a distressing dyspnea. The man presented an enormous swelling of the right side of the neck, which extended across the midline. The enlargement had been considered to be an enlargement of the thyroid gland, but upon palpation a thrill could be felt, and upon auscultation a bruit heard, which was transmitted down below the clavicle.

Fluoroscopic study and Roentgenograms of the chest showed a large pulsating aneurysm arising from the right side of the aortic arch and



Fig. 1. Roentgenogram of chest illustrating aneurysm involving the innominate and right subclavian.

ascending into the superior mediastinum. The trachea and esophagus were sharply displaced toward the right. The trachea lies 5 cm. to the right of its normal position and at one point was narrowed to less than 1 cm. in width. The lung fields were clear and the heart was not enlarged.

Mirror laryngoscopy revealed a complete paralysis of the right vocal cord, the cause of which was considered to be the aneurysm involving the right subclavian and innominate artery.

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A SURVEY OF ANTRAL SURGERY — REVIEW OF 100 CASES.

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DR. RECTOR T. DAVOL, New York.

In the last decade surgery of the antrum has become more popular, particularly since Goodyear¹ published his technique in 1934 regarding the antrostomy. The current literature deals with antrostomy as the most popular surgical means of approach to the antrum. It is the purpose of this paper to compare the end-results of conservative and radical surgery of the antrum. (Since the authors are junior residents in a specialty hospital, surgical principles will be intentionally omitted.)

There have been frequent attempts to evaluate the end-results of antral surgery, but all of the workers, except Wilkinson,² have used the symptomatic point of view or the questionnaire method as a means of obtaining their results. The figures reported and the results obtained confuse the casual observer. We do not believe that absence of symptoms is a reliable criterion of cure. The reason is obvious but will be explained in detail later. There remain two methods of choice: antroscopy and antral washes; we have selected the latter.

METHOD.

Our cases were operated on in 1940-1941,* and at random we selected for abstraction the cases of 50 patients on whom the Caldwell-Luc operation was done, and 50 who had antrostomies. No cases in that series were omitted in order that a uniform and unbiased report could be obtained. Where the data was inadequate or incomplete, we charted that particular case as "results unknown," and we then attempted to interview that patient. If the patient could not be interviewed, the original classification was recorded. Our abstraction was made more difficult by several factors: First, there

*From the combined Saunders, Smith, Craig, Hanley, Hirst, Ryan services at the New York Eye and Ear Infirmary, New York.

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was no completely uniform surgical technique for either operation — the procedure varied with the operator; second, in a large clinic the large number of washes available for the private patient cannot be offered the clinic patient.

All our cases were irrigated postoperatively, except two which received dry suction. We have treated these cases postoperatively like any open wound, *i.e.*, maintaining surgical cleanliness and drainage by frequent and copious irrigations of normal saline. The local use of antiseptics was intentionally omitted, and chemotherapy was not employed. Lastly, where the subjective symptoms of the patient were not charted, these cases were then classified as "results unknown."

AGE INCIDENCE.

Our youngest patient for antrostomy was a 10-year-old boy; for Caldwell-Luc, a 14-year-old girl (see Table I). McArthur³

TABLE I.
Average Age in Years of 100 Patients Who Had Antral Surgery.

Age	Caldwell-Luc	Antrostomy
Highest	59	60
Lowest	14	10
Average	36.8	37.7

has mentioned that age is not a contraindication for surgery. His youngest patient operated upon was 21 months old, and a double radical (Caldwell-Luc) was done. He says that, as a rule, teeth are not damaged and all the permanent teeth erupted. We cannot verify or contradict this statement.

TABLE II.
Duration of Diseases as Determined by Antral Washes.

Duration	Caldwell-Luc	Antrostomy
In Months	6.43	5.55
Total No. Washes	350	311
Average Washes	7.0	8.12
Unknown	5	12

DURATION OF DISEASE.

In Table II the duration of the disease, as determined by antral washes, actually means the duration of time, preoperatively, that the patient was treated in the out-patient depart-

ment. It is obvious in most cases that the disease antedated this period for months or possibly years. The five cases recorded as of unknown duration in Table II were referred from the eye department because of ocular complications from sinusitis, and immediately received a Caldwell-Luc operation.

SYMPTOMS.

In our series of 100 cases, 64 per cent of the patients complained of profuse nasal discharge, either white or yellow. The next most common complaint (see Chart III) was head-

TABLE III.
Complaint of 100 Cases of Chronic Antritis That Came to Surgery.

Complaint	Caldwell-Luc	Anastrostomy	Average
Nasal Discharge	31	33	64%
Headache	21	25	46%
Postnasal Discharge	15	16	31%
Nasal Obstruction	12	15	27%
Antral Pain	3	5	8%
Allergic Symptoms	4	3	7%
Ocular Complaint	5	0	5%

ache, which was accompanied by postnasal discharge in 27 per cent of the cases. Antral pain was surprisingly low and probably suggests that chronicity or adequate drainage were present.

RELATED DISEASE.

Fifty-two per cent of the patients did not present clinical evidence of a related disease (see Chart IV); 16 per cent

TABLE IV.
Related Diseases.

Disease	Caldwell-Luc	Anastrostomy	Average
None Present	25	29	52%
Allergy	10	7	16%
Middle Ear Disease	6	11	16%
Ocular Disease	5	3	8%
Chronic Bronchitis	3	1	4%
Atrophic Rhinitis	2	1	3%
Diabetic Mellitus	1	0	1%
Bronchiectasis	0	0	0

showed evidence of acute or chronic middle ear disease or mastoiditis. At this institution it is a routine procedure to irrigate the antra, if feasible, when patients are being treated

for purulent middle ear disease or mastoiditis. Sixteen per cent of the patients were being treated concomitantly in the allergy department. This figure closely agrees with Hansel,⁴ who says that allergic manifestations are present in 12 per cent of an otolaryngological practice.

TABLE V.
Gross Pathology.

	Caldwell-Luc	Antrostomy
Normal	4	0
Not Known	8	47
Acute Membrane	0	0
Chronic Suppurative	18	3
Hyperplastic	30	0
Benign Tumors	2	0
Malignant Tumors	0	0
Osteitis	3	0

PATHOLOGY.

Because the window operation does not give adequate visualization of the antrum gross pathological changes were evident in only three antrostomy cases. We refer to Wright,⁵ who states "that clinical symptoms and gross observations in the antrum were not indicative at all of the nature of the infiltration." Thirty patients who had the Caldwell-Luc operation had gross hyperplastic changes. We recall two cases which presented a mass on Roentgenologic examination, but the membrane and cavity appeared normal when the patient presented himself for the Caldwell-Luc operation. We did not encounter any cases of malignancy or osteomyelitis (see Table V).

TABLE VI.
X-ray Appearance of the Antra.

	Caldwell-Luc	Antrostomy	Average
Not Taken	0	4	4%
Fluid	2	4	6%
Thick Membrane or Cloudy Antrum	39	44	85%
Mass	14	0	14%
Normal	0	0	0

All but four patients had Roentgenologic examination of the sinuses. Lipiodol was seldom used because we feel that it adds little or nothing to the X-ray picture. Eighty-five per cent of the cases presented Roentgenologic evidence of thick membrane or cloudy antrum.

Roentgenologic examination also revealed that the ethmoids and frontals were involved in more than half of the cases. (See Chart VII). Dental pathology was a causative factor in 6 per cent of the cases. This is in close agreement with Griffith,⁶

TABLE VII.
Contributing Foci of Infection by X-ray.

	Caldwell-Luc	Antrostomy	Average
None	12	5	18%
Ethmoids	26	34	63%
Frontals	27	36	65%
Sphenoids	22	26	51%
Teeth	4	2	6%
Trauma	0	0	0

who had an incidence of 7.18 per cent in a series of 404 cases. It is our opinion that untreated frontals and ethmoids are frequently the cause of poor results in antral surgery.

Where a bilateral antrostomy or Caldwell-Luc has been done, accompanied by a unilateral ethmoidectomy, we have observed that the results of antral surgery were usually better on the side where the ethmoids received attention. In several of our failures, a free flow of pus from the frontal region was observed postoperatively.

The average hospital stay was 5.5 days for the Caldwell-Luc and 3.2 days for the antrostomies. There were no post-operative complications in 97 patients who went to surgery. Of the remaining, one developed pneumonia, another had a hemorrhage following the radical procedure. During one antrostomy the rasp broke and was swallowed. The patient was hospitalized for 18 days until the small part was passed.

CHART VIII.
Side Operated Upon.

	Caldwell-Luc	Antrostomy	Average
Right	19	12	31%
Left	27	21	48%
Bilateral	4	17	21%

(We cannot explain the left-sided predominance of antral surgery.)

Ether was used in 12 per cent of the cases (10 Caldwell-Lucs and two antrostomies), while local anesthesia was employed for the remaining 88 per cent. We have done the bilateral Caldwell-Luc under local anesthesia with no undue

discomfort to the patient. The right side was operated upon in 31 per cent of the cases; the left in 48 per cent, and bilateral in 21 per cent (see Chart VIII).

In regard to Chart IX, in each case the antral surgery was done on the same side as the previous nasal surgery. Eleven

CHART IX.
Previous Operative Procedures.

	Caldwell-Luc	Antrostomy	Total
T & A	20	11	31
Polypectomy	6	11	17
Submucous Resection	6	8	14
Frontal Surgery	4	4	8
Ethmoid Surgery	4	4	8
Sphenoid Surgery	1	2	3
Mastoid Surgery	3	4	7
Bronchoscopy	0	0	0
Antrostomy	8	3	11
Surgery of Turbinates	3	2	5
Caldwell-Luc	1	0	1
Unknown Intranasal Surgery	3	2	5

per cent of our cases had previous antrostomies, while 1 per cent had the Caldwell-Luc operations. The high incidence of polypectomy is to be noted.

Sixty-three per cent of our patients were males and 37 per cent females, almost equally divided between the radical and conservative operation.

CHART X.
Sex Incidence of Antral Surgery.

	Caldwell-Luc	Antrostomy	Average
Males	34	29	63%
Females	16	21	37%

POSTOPERATIVE RESULTS.

In our series we obtained excellent results in 54 per cent of the cases receiving the Caldwell-Luc operation, and 26 per cent in the antrostomy. Our criterion was a persistent clear wash. There were a few cases with an occasional purulent wash (*i.e.*, clear with transient recurrences) (see Chart XI). We had 30 per cent failures in the Caldwell-Luc procedure, and 56 per cent failures in the antrostomy operation by the same criterion. The presence of shreds in the wash was indicative of active infection in our series, just as they would

indicate residual urethritis in the two-glass test. As a criterion of cure, the value of this antral wash in contrast to reliance on symptomatic relief is illustrated in numerous cases where a clear wash was obtained but no subjective improvement was noted. Further examination not infrequently revealed a deviated septum, atrophic rhinitis, or an active infection in the ethmoids or frontals. Interrogation in two cases gave us a rather typical history of vasomotor rhinitis in patients who had had surgery for relief of their

CHART XI.
Postoperative Results by Antral Wash.

	Caldwell-Luc		Antrostomy	
	Cases	Per-centage	Cases	Per-centage
Clear Wash	27	54%	13	26%
Clear with Transient Recurrences	3	6%	6	12%
Purulent	15	30%	28	56%
Unknown	5	10%	3	6%

symptoms. On the contrary, we not infrequently noticed patients who were symptom-free, yet on irrigation gave a purulent return. When infection is observed in the nose, following Caldwell-Luc operation, we are reminded of Wright,⁵ who points out that "as long as there is any disease left in the nose, there may not be a satisfactory regeneration of the epithelium and probably not a satisfactory clinical result."

CHART XII.
Clinical Postoperative Results.

	Caldwell-Luc		Antrostomy	
	Cases	Per-centage	Cases	Per-centage
Asymptomatic	12	24%	3	6%
Improved	14	28%	13	26%
No Change	11	22%	15	30%
Not Known	13	26%	19	39%

From the clinical point of view, 24 per cent of the Caldwell-Luc operations were successful, while only 6 per cent of the antrostomies were equally successful. Twenty-eight per cent of the Caldwell-Lucs and 26 per cent of the antrostomies were definitely improved, but one or two constant nasal symptoms persisted. We observed 22 per cent failures in the radical operation and 30 per cent in the conservative operation (see Tables XI and XII). Theoretically, the oto-

laryngologist is primarily interested in converting a diseased antrum into a healthy antrum. A review of the antral washes following antrostomy is suggestive that this operation at best is only an ameliorative procedure.

Although our results are far below what we would like to have, it is apparent that the Caldwell-Luc operation offers the patient the best hope of obtaining a healthy antrum and complete relief of symptoms due to chronic maxillary sinusitis. It is assumed, of course, that the antral mucosa has passed beyond the reversible stage.

We observed dental fistula in six cases of radical surgery and two in the antrostomy; five occurred postoperatively, but closed permanently without resort to additional surgical measures one fistula was present before surgery and did not close following a Caldwell-Luc operation, and another pre-operative fistula closed after radical antral surgery. Summarizing, then, we had one fistula that persisted postoperatively.

Our follow-up period was 6.6 months for the Caldwell-Lucs and 6.7 months for the antrostomies. At a glance, this time interval may seem inadequate, but it is probably adequate for an antrum to return to its normal state when pathological tissues are removed and adjacent foci of infection attended to.

SUMMARY.

An attempt was made to evaluate end-results from antral surgery in chronic maxillary sinusitis. One hundred cases were analyzed; in 50 the Caldwell-Luc operation was performed, in 50 antrostomy was done. The patients were from the out-patient department of the New York Eye and Ear Infirmary and were operated upon during 1940-1941. There are five methods by which results may be evaluated: 1. Symptomatic, 2. questionnaire, 3. antral irrigations, 4. antroscopy, 5. X-ray. The first two methods were discarded because of their inadequacy. We have not been successful with the antroscope, although in some hands antroscopy doubtlessly has been of great value. X-ray of the antra following radical surgery often presents a dark, almost black shadow, the interpretation of which is difficult. The use of a contrast medium such as lipiodol might be of value. We have found the antral

irrigation to be the simplest and easiest approach when used repeatedly. In a large number of cases we found the antrostomy opening quite small and located superiorly, just beneath the attachment of the inferior turbinate, usually quite well posteriorly, and in such a position the aperture certainly does not permit drainage or ventilation. Its purpose has then been defeated. We do not know the cause of our failures. We hope to investigate them and report them in a subsequent paper. The failures are best explained at the present by: 1. Mistaken diagnosis, 2. failure to eliminate adjacent foci of infection, 3. antrostomy opening too small, 4. failure to correct pre-existent anatomical defects, and 5. improper surgical technique.

CONCLUSIONS.

1. One hundred cases that received the Caldwell-Luc operation and the antrostomy operation were evaluated.
2. A persistent clear antral wash was our criterion of cure.
3. The Caldwell-Luc operation presented a clear wash in 54 per cent of the cases; antrostomy, in only 26 per cent of the cases, over an average period of 6.65 months.
4. The indication for antral surgery is relative rather than absolute.
5. Absence of absolute indication for antral surgery in cases of chronic maxillary sinusitis is probably an important factor in our poor results.

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218 Second Avenue.

GRANULAR CELL MYOBLASTOMAS OF THE EXTERNAL AUDITORY MEATUS.*†

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Myoblastic myomas or granular cell myoblastomas are peculiar tumors which were first described by Abrikossoff (1926). They are usually small, less than 1-2 cm. in diameter, and only occasionally do they obtain large size. The microscopic picture of these tumors varies considerably. The characteristic elements are polygonal cells and ribbon-like syncytial masses with mostly centrally located nuclei and a granular cytoplasm which is free from lipoids, glycogen or amyloid. Cross or longitudinal striations are only occasionally seen. By most of the authors these cells are identified with myoblasts, the ancestral cells of the striated muscle cells. Some times larger areas of tumor cells are separated from each other by thick strands of connective tissue; in other cases a limited number of cells is surrounded by a thin sheath of connective tissue which resembles the internal perimysium. Usually the granular cell myoblastomas are clinically benign tumors, even though they are composed of immature cells and occasionally show infiltrative growth. There were very few clinically malignant cases showing local recurrences after removal and formation of metastases.

Since Abrikossoff's first publication, about 100 such cases have been described. They are found in various places, chiefly in immediate relation to the striated musculature, but also in the subcutis and other regions which are free from striated muscle fibres. The sites of predilection of these tumors are in the upper digestive tract (more than 40 cases were situated in the tongue) and to a lesser extent in the upper respiratory tract (about 10 cases in the vocal cords). In tumors of the tongue, larynx and skin, the covering epithelium shows frequently marked, sometimes epithelioma-like proliferative changes.

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There is no unanimity among the authors about the histogenesis of these tumors. Abrikossoff originally regarded them as neoplasms due to faulty excessive regeneration. After tumors had been described on places which were free from muscle fibres, Klinge's theory (1928) of the dysontogenetic origin of these tumors from displaced muscle anlagen became more generally accepted.

In the following reports, three cases of granular cell myoblastomas of a hitherto unknown localization are described.

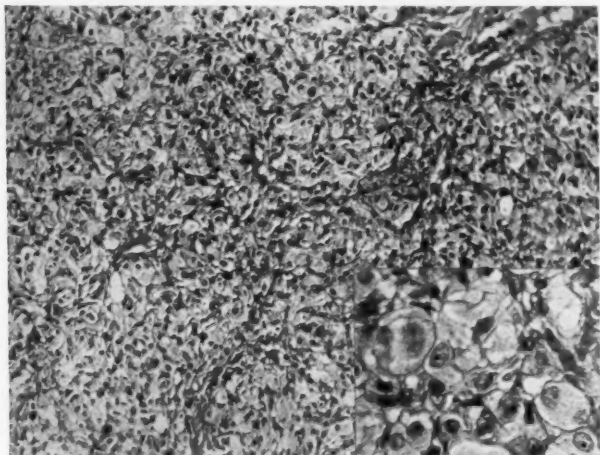


Fig. 1.

REPORT OF CASES.*

Case 1: M. R., aged 60. Admitted June 23, 1930.

History: Patient had a polyp in the right ear for 20 years, which was removed nine times and always recurred. No history of discharge from the middle ear.

Examination: Ears: Right ear: The external canal is filled with a smooth, pedunculated tumor, apparently fixed to the posterosuperior wall of the inner part of the external canal. The drum could not be seen. Left ear normal.

Operation: The tumor was removed in two pieces with a snare. There was profuse bleeding, and the canal was packed with gauze.

*Cases 1 and 2 have also been included by Dr. R. C. Horn and Dr. A. P. Stout in a paper to be published in *Surgery, Gyn. and Obstetrics*, dealing with 30 cases of granular cell myoblastoma which have been accumulated in the laboratory of surgical pathology of Columbia University.

Histological Report (S.P. 43344): Sections through the lateral part of the tumor show that it is covered on three sides with stratified squamous epithelium. The main bulk of the tumor is made up of loose fibrous connective tissue containing a few small blood vessels and is infiltrated with a moderate number of round cells and plasma cells. Located near the inner end of the specimen is a group of large pale staining cells with round or oval nuclei showing prominent nucleoli. The cytoplasm of these cells is abundant and granular (see Fig. 1). These cells are closely packed and occasionally interspersed with delicate strands of connective tissue. Occasional large mononuclear cells containing an acidophilic granular cytoplasm are seen among them. No mitoses are visible. In the immediate vicinity of these muscle cells, small blood vessels are quite numerous. Sections prepared by the Scharlach R stain show that these cells contain no lipoid material. Sections prepared with the Laidlaw silver stain show that the cells and their nuclei are for the most part silver-negative.

Sections from the inner end of the tumor show the main bulk of the specimen made up of numerous small closely packed capillaries. Some of the cells described in the larger specimens are seen among these capillaries. Large amounts of extravasated blood are scattered throughout the tissue.

Diagnosis: Granular cell myoblastoma.

Course: After the packing was removed, a small part of the drum could be seen, but apparently some tumor tissue had been left on the posterior wall of the canal. In the following months the remnants of the tumor disappeared gradually under cauterization with silver nitrate. Examination on Jan. 23, 1931, showed the external canal completely epithelialized, and in the inner part of the floor of the canal definite pulsation could be seen. Patient complained of dizziness and a ringing in the right ear. Examination on May 22, 1931, showed complete disappearance of the tumor and a normal condition of the drum. July 18, 1932: No recurrence. Audiogram showed complete deafness in the left ear. Patient has not been seen since that time.

Case 2: R. E., 77 years old. Admitted June 9, 1942.

History: Intermittent discharge from the right ear for five years. For the last four years the face has been twisted to the left, and the patient has been unable to close her right eye. For the same period she has had no hearing in the right ear. For the past three weeks there has been frequent bleeding from the right ear; the patient complained of difficulty in swallowing food in the right side of the throat and stated that when she eats fast she chokes. Dizziness on quick turning of the head. No pain or headaches.

Examination: Ears: Right ear: Fetid discharge from the external canal. The canal was filled with a polypoid mass which protruded to the meatus. Complete deafness and loss of vestibular function was also noted. Left eardrum normal. Slight perception deafness, normal vestibular reactions.

Nose: Moderate deflection of septum to the right.

Throat: Tonsils small, atrophic. Right side of soft palate immobile.

Nasopharynx: Negative.

Larynx: Right vocal cord in cadaveric position.

Transillumination of Sinuses: All sinuses clear.

Complete facial paralysis on the right side. No nystagmus.

Biopsy from the mass in the right external auditory meatus:

Granuloma of the external canal, no evidence of neoplasm:

X-ray of the temporal bones. Both mastoids rather small. The pneumatization is scanty. On the left side the cells are clear and the septa crisp. On the right side the cells are clouded. No evidence of cholesteatoma.

One week after admission a *radical mastoidectomy* was attempted. A tumor mass was found, filling the middle ear and the external canal, which bled profusely. It probably originated in the middle ear. Due to the bleeding, the operation was not completed.

Histological Examination (S.P. 82404): Sections show a very vascular lobulated tumor covered by a thin layer of stratified squamous epithelium and with areas of necrosis and hemorrhage. The tumor cells are large, with abundant cytoplasm, packed with minute pink-stained granules, occasionally separated by vacuoles. The nuclei, though variable, are large. They have prominent nuclear markings, and frequently well defined nucleoli. Only one or two mitotic figures are seen in the entire specimen. The tumor is highly vascular, most of the vessels being simple, endothelium-lined channels. Where the cells are closely packed together, and this represents only a small portion of the tumor, the perivascular arrangement is striking. Here the tumor cells have the appearance of being grouped in small nests, separated by delicate vascular strands with relatively little intervening connective tissue. Elsewhere the tumor is edematous and contains much collagen, and the peculiar perivascular arrangement and neoplastic character are not so evident.

Diagnosis: Granular cell myoblastoma.

A week later, it was attempted to *complete the radical mastoidectomy*.

Again profuse bleeding was encountered from the middle ear and after removal of the bridge the operation was prematurely finished without formation of a plastic flap.

The *postoperative course* was uneventful. The patient was discharged from the hospital and referred back to her private doctor.

Re-examination on Aug. 27, 1942, showed a small retroauricular opening. The middle ear was still filled with granulations, but they showed a definite tendency to regression.

The facial paralysis remained unchanged in all three branches.

In the two above described cases a granular cell myoblastoma was found in the external auditory meatus. In one of these cases (No. 2) an extension of the tumor into the middle ear was proven by the operative findings; a destruction of the labyrinth was indicated by complete deafness and loss of vestibular function. In the other case there probably was an extension into the middle ear and an affection of the labyrinth as the patient had complained of dizziness and had shown complete deafness. Unfortunately, the vestibular apparatus was not examined.

There are no reports in the literature about myoblastomas in this region; however, a case described by me in 1937 under the tentative diagnosis of a neurogenous tumor of the facial nerve apparently belongs to this group and may be added as Case 3.

Case 3: A woman, 27 years of age, complained of tinnitus and increasing deafness for five years, facial paralysis for one year, discharge from the right ear and attacks of dizziness for two weeks.

Clinical examination showed slight facial paralysis in all branches and an obturating polyp in the depth of the right external meatus. The right ear was completely deaf and the vestibular irritability lost. X-ray showed the pneumatization of the mastoid moderately well developed, the cells clouded, no evidence of bone destruction.

Operation: A radical mastoidectomy was performed. The otoscopically visible polyp originated from the innermost part of the external meatus and extended from there in the external canal and into the middle ear. The drum was destroyed and the ossicles missing. The removal of the polyp was followed by severe bleeding.

The *postoperative course* was uneventful. A few months later the cavity was completely epithelialized; the facial paralysis and deafness remained unchanged.

Histological examination showed the tumor composed of large polygonal cells with mostly centrally located nuclei (see Fig. 2). The nucleoli were

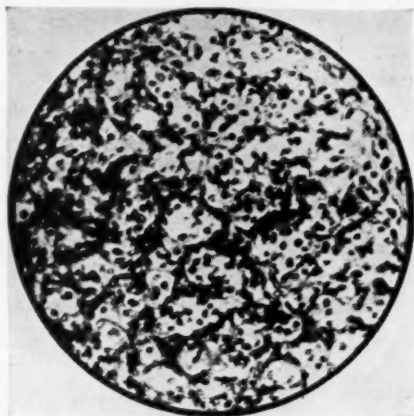


Fig. 2.

clearly visible. The protoplasm of the cells was finely granular and contained small "vacuoles." It was free from fats or lipoids. The tumor was divided in small and large areas by strands of connective tissue. Small groups of tumor cells were surrounded by a fine network of connective tissue. No definite diagnosis was made, but the pathologist thought that the tumor was probably of neurogenous nature.

The histological picture of this tumor shows a striking similarity to the two above described tumors, and, in retrospect, I think that it was a granular cell myoblastoma rather than a neurogenic tumor.

COMMENT.

Case 1 showed clinically a recurrent polyp in the right ear for 20 years; complete deafness and attacks of dizziness, absence of facial paralysis or discharge from the ear. The drum was normal.

Case 2 showed a polyp of unknown duration in the right ear, discharge from the ear for five years, facial paralysis and deafness for four years, complete loss of vestibular function. The drum membrane and the ossicles were destroyed. It should be mentioned that the paralysis of the right half of the soft palate and of the right recurrent nerve apparently was not connected with the tumor. It was caused by changes in the right nucleus ambiguus in the medulla oblongata, probably due to occlusion of a branch of the posterior-inferior cerebellar artery.

Case 3 showed deafness for five years, slight facial paralysis for one year, discharge for two weeks and a dead labyrinth at examination. The drum and the ossicles were destroyed.

In all three cases the exact site of origin of the tumor could not be determined. In two of the cases which were not too far advanced, the pedunculated tumor mass originated from the innermost part of the external auditory meatus. As already mentioned, myoblastomas develop frequently in immediate relation to the striated musculature. It seems possible that the tumors originated from the belly of the stapedial muscle, which lies close to the facial nerve; but myoblastomas may also develop on a dysontogenic basis in regions which are normally free from striated muscle fibres.

DIAGNOSIS AND DIFFERENTIAL-DIAGNOSIS.

Regardless of the exact site of origin, the tumors develop in the immediate neighborhood of the descending part of the facial nerve. They show a similar mode of growth and extension as tumors originating from the descending part of the facial nerve and, therefore, also a similar symptomatology.

The clinical picture of the tumors of the descending part of the facial nerve, which histologically are always neurinomas (perineural fibroblastomas), was described by me in 1935. My investigations were based on the findings in six cases. Since 1935 six additional cases have been reported. The clinical picture is characterized by slowly increasing paralysis of the facial nerve, which, for a long time, is the only clinical symptom. The otoscopic examination shows a polyp in the external auditory meatus which originates in

the posterior wall. The drum membrane remains intact for a long time and the hearing normal, unless the meatus is completely blocked by the tumor. Later the tumor fills the middle ear, destroys the drum, and even may erode the labyrinthine capsule. Deafness and loss of caloric irritability of the labyrinth may result. A secondary infection of the middle ear may occur at any time after the destruction of the drum and labyrinthine or endocranial complications may ensue. The growth of the tumors is purely expansive and very slow. It is not accompanied by pain. If pain is present, it is due to a secondary purulent infection. The similarity of the clinical picture of neurinomas and myoblastomas is clearly indicated by the fact that in Case 3 I had made the preoperative diagnosis of neurinoma of the facial nerve.

An exact differential-diagnosis between myoblastoma and neurinoma is at the present time impossible, and the last decision rests with the pathologist. It seems, however, that the facial paralysis occurs in myoblastomas at a much later date than in neurinomas. This is easily understood because myoblastomas originate in the vicinity of the nerve; neurinomas in the nerve itself. In Case 1 a facial paralysis was absent after at least 20 years' duration of the disease. Tendency to profuse bleedings, either spontaneously or upon removal of the tumor, is apparently a further frequent characteristic of the myoblastomas, but not of the neurinomas.

Particular differential-diagnostic difficulties arise in those cases in which a chronic infection of the middle ear has developed. Good development of the pneumatic system of the mastoid and evidence of extensive bone destruction, particularly of the posterior inferior wall of the osseous meatus and of the floor of the middle ear, will speak in favor of tumor and against ordinary chronic middle ear suppuration with polyp-formation; but impeded pneumatization will not rule out the presence of a tumor. The absence of other signs of tuberculosis will help to rule out a proliferative tuberculosis of the middle ear.

Cancers of the middle ear develop almost invariably from long-standing middle ear suppurations. Aural discharge is for a very long time the only symptom of these cases. They are, contrary to neurinomas and myoblastomas, frequently accompanied by severe pain.

THERAPY AND PROGNOSIS.

Observations on three cases are not sufficient to allow a positive judgment, yet they seem to indicate that surgical therapy is the only rational therapy. In not too far progressed cases in which the drum membrane is still intact, the endaural removal may be tried; but even in these cases a radical mastoidectomy is the method of choice. It is the only method in cases with extensive involvement of the middle ear. This operation gives a far better idea of the size and extent of the tumor and permits more radical surgery. A complete removal is sometimes impossible, due to the profuse bleeding. It seems that it is not absolutely necessary and that parts of the tumor which are left behind undergo a gradual regressive metamorphosis and disappear eventually. The postoperative course in Cases 1 and 3 favors this assumption. There was complete disappearance of the tumor and no recurrence after one year and several months, respectively. In Case 2 the time since the operation is too short to allow any conclusions.

SUMMARY AND CONCLUSIONS.

Three cases of granular cell myoblastomas of the external auditory meatus are reported, the first known observations in this region. The histology, possible site of origin, mode of extension, clinical symptomatology, diagnosis, differential-diagnosis and treatment are discussed.

The clinical picture of the disease is very similar to that of tumors of the descending part of the facial nerve.

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AERO-OTITIS MEDIA AND AERO-SINUSITIS.*†

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Ear symptoms are the commonest clinical complaints that occur in aviation, affecting both pilots and passengers. We all have probably experienced at least a few of the symptoms which occur in connection with flying, but, paradoxically, many of us have never been up in an airplane. At times, automobile traveling, up and down hill and dale, has given us a plugged ear sensation, followed by a "popping open" or a clicking after swallowing.

"Otitis in the Air" or aero-otitis, as described by Armstrong and Heim¹ in 1937, is an old clinical phenomenon dressed up in a modern streamlined name. The designated name of "aero-otitis" is a good one, for it is descriptive to the extent that its etiology is due to mechanical and physical factors in relation to the atmosphere. As individuals in static relation to the atmosphere, we are subject to its variations in barometric pressure, humidity, temperature, etc.; however, our physiologic responses and mechanical efficiency are lagging behind the ingenious mechanical development of the airplane. Our ears simply cannot keep up with the incredible speed of ascent and descent and maneuverability of our modern aircraft. Vertical climbs of 5,000 feet per minute and power dives in excess of 40,000 feet per minute by means of 2,000 horsepower motors are common occurrences in this war.

To consider the practical clinical physiological changes which take place with the changing of the flyer's relationship to the atmosphere, let us travel along with the flyer from his take-off to his landing. In repose on the ground we naturally expect that the flyer's upper respiratory tract is perfectly normal. The requirements for normalcy are rigid for flyers in the military service. The subject, naturally, must have passed a careful clinical otolaryngologic examination. No

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pathology is present if the flyer is to be considered on so-called "flying status." If, in the interim, he has developed hay fever, rhinitis, sinusitis or any of the common ailments indigenous to human respiratory tracts, he should be "grounded" until the pathology is rectified.

EFFECTS OF ASCENT.

Now to take the aviator up into the air, he is subject to certain definite changes in ascent. On the ground his Eustachian tubes are normally closed and he has normal atmospheric pressure within and without his tympanic cavity. As you all know, the higher up one goes the less the atmospheric pressure. At 180 feet of elevation there is a perceptible sensation of pressure change in the ear. At this time there is a 3 mm. mercury increase of pressure in the tympanic cavity as compared with the atmosphere, and at this elevation there is a slight bulging of the tympanic membrane. At 500 feet a positive pressure differential of 15 mm. mercury is present. There is now heard a click in the ear which is the clinical sensation of the Eustachian tube opening by virtue of this built-up intratympanic pressure, and the drum snaps back to normal position. As one continues to a higher elevation, the differential pressure necessary to open the tubes becomes less. because at higher altitudes the air, being less dense, passes more readily through the Eustachian tubes. If the Eustachian tube is stenosed by swelling or is not functioning properly, a positive pressure of 30 mm. of mercury brings on a tinnitus which becomes an additional factor along with fullness and diminished hearing. Above 30 mm. there is pain and vertigo which becomes unbearable. The manifestation of these symptoms was demonstrated by Armstrong and Heim, of the U. S. Army Aeronautical Research Laboratories, and it was Armstrong who first used the term "aero-otitis media." This in a general way is the ear physiology of ascent.

EFFECTS OF NOISE.

The aviator is cruising about after he has reached his desired elevation. Now, what are the factors which may affect his ears? Nowadays in modern military aircraft he is flying in a closed cockpit, partially soundproofed plane which diminishes the noise of the wind-slip, the propeller, motor

and exhaust, to a certain extent; however, he is generally wearing earphones while beam flying and is listening to a rather loud note which he has tuned up to a high amplification to overcome the threshold of the airplane noise. This noise factor has been investigated by Myrick,² Firestone³ and others. In general, the audiograms on flyers who complain of diminished hearing show the following most constant audiometric pattern: A drop in the 2,048 and 4,096 double vibrations. Various theories as to the etiology of the audiogram tracings have been proposed; among them are injuries to the external hair cells of the cochlea as described by Lurie,⁴ due to constant exposure to coarse, high frequency tones. Firestone claims that audiogram tracings similar to otosclerosis tracings are due to constant vibration of the neuroskeletal system transmitted to the skull. Armstrong discounts this, feeling that the cushioning of the parachute seat and back rest dampen the vibrations sufficiently. All sorts of earplugs and protective devices have been designed to prevent excessive noise, but our experience at Bradley Field has been that some of the enlisted men in transport planes use cotton in their ears. Some have discarded plugs, complaining that they fit poorly, and prefer to use absorbent cotton dipped in vaseline. If during long-distance flying changes in the atmosphere take place, the flyer is expected to know certain procedures in forcing the tubes to open. Chewing gum, simulating a yawn, swallowing, are methods by which the Eustachian tubes become patent. In sleeper commercial planes it is the custom of the hostess when awakening passengers to have them open their Eustachian tubes by doing a Valsalva procedure. During slumber one swallows but once every five minutes, and if there is a sudden drop in altitude this might not be sufficient to keep the tubes patent.

EFFECTS OF DESCENT.

The greatest of all ear hazards takes place during descent, and occurs in military flying because of the rapidity of descent necessary for attack and dive bombing. During descent, naturally, the atmospheric pressure, in contrast to ascent, is increasing, and the tympanic cavity now has a negative differential pressure instead of a positive one. The symptoms are quite the same as those that occur during

ascent, but the mechanics are different. The negative pressure is not relieved by automatic popping open of the tubes in this instance because of the flapper-like valve action of the Eustachian tube. It requires a voluntary muscular action to open this flutter-valve. In making rapid descent, the speed with which the flyer returns to the ground may be such that the delicate flutter-like mechanism cannot keep up with the rapidity of descent, and there is thus built up a high negative pressure within the tympanic cavity. A negative pressure in excess of 80-90 mm. of mercury is impossible to overcome by muscular action, and relief is obtained only by a return to a higher altitude. When the negative pressure reaches 60 mm. of mercury or above, pain in the ear is a prominent symptom. Between 60 to 80 mm. of negative pressure, the pain begins to radiate to the temporal region and to the cheek. Still higher pressures cause radiation to the parotid gland, with accompanying deafness and vertigo. Between 100 to 500 mm. of negative pressure, the tympanic membrane perforates. When the pressures referred to in the above discussion last any length of time, a traumatic effect is manifest in the mucosa of the middle ear cavity, and all the inflation in the world will not cure this condition. The resultant clinical appearances may vary from a typical retracted drum to a bulging one, with fluid levels and air menisci visible in the middle ear.

In our experience aero-sinusitis is not very common, nor is it a major problem with Army flyers. Probably the reason is that in the course of clinical examination, the appearance of the internal nose as compared with the ear is a more obvious indication of the condition of the sinuses. Polypoid changes and suppurative conditions increasing nasal resistance to air flow are more obvious than functional changes which take place in the Eustachian tubes when stress is placed upon them.

The mechanics of aero-sinusitis are quite simple: In ascent the atmospheric pressure decreases; therefore the air contained in the sinuses is forced out through the ostium to equalize the pressure. In level flying there is an equilibrium between ingress and outflow. On descent there is an inflow of heavier air into the sinus. If the sinus structures, and particularly their ostia, are normal, then no symptoms result.

Let us consider the possibilities, if for example: 1. pus was present, bathing the maxillary ostium. In ascent no harmful effect occurs because there is an egress of heavier air from the sinuses and nose. In descent with the pressure gradient into the sinus from the nose this suppurative material is forced through the ostium; 2. redundant or polypoid tissue were present about the ostium, acting like a ball valve. In ascent, then, there would be egress of air about the polypoid tissue, but in descent, particularly if rapid, the increased pressure simply places a polypoid lid on the ostium and seals off the cavity with a negative gradient. This may cause true vacuum headache and pain. The diagnosis of vacuum headache has much more justification since aviation has become popular.

The subsequent pathological changes are engorgement and swelling of the mucosa. The lid of edematous redundant tissue about the ostium must be shrunk by medication or have subsided to a considerable degree to open the ostium in order to again aerate the bony cavity.

The review of the treatment of aero-otitis and aero-sinusitis is simple if one remembers the pathological physiology which has taken place. In general, the line of treatment is directed toward restoring normal function of the Eustachian tubes and sinuses and thus equalizing the pressure. This is accomplished by the use of the shrinking agents such as cocaine 4 per cent and neosynephrin $\frac{1}{4}$ of 1 per cent being those of choice; also the gentle use of the Politzer bag or preferably Eustachian tube catheter. The nasopharyngoscope should be readily available for observation of the nasopharynx.

Some observations that we have made in the treatment of these conditions at Bradley Field are rather interesting. The incidence of aero-otitis and aero-sinusitis seems to vary with the season. Some ambitious, red-blooded pilots during fall weather, when rhinitis is prevalent, do not report a mild running nose. They may do a great deal of altitude and practice flying with resulting Eustachian tube closure. Many of the enlisted personnel who arrive at the field commonly have aero-otitis after a two- or three-day flight. Symptoms in this group are more common than among the commissioned men, that is, the ship operators, and we suppose it may be because the enlisted men are not carrying out the prophylactic swallow-

ing and yawning that the pilots have learned to do very efficiently. It undoubtedly becomes habitual for a pilot to do this after a time.

Suppurative otitis media has been seen only once superimposed on aero-otitis in all the cases that we have had at Bradley Field in the past year.

A navigator, age 22, was admitted to the hospital because of "popping" and deafness in both ears. Examination of the left drum showed a dry, clean-cut, large marginal perforation through which the incudostapedial joint could be seen. There was no surrounding redness of blood vessels in the drum. The right drum showed considerable retraction and a fluid level was present in the middle ear. The perforation in the left drum was typical of the classic old chronic dry perforation, and the patient persistently denied any previous trouble in his left ear. The right ear was slow to return to normal with conservative treatment, and a pin point perforation was made by paracentesis and the serum was sucked out with a pneumatic otoscope and blown out with a catheter. The left perforation remained open for about three or four days and then closed very rapidly. If we may be permitted to be facetious, "we could almost watch it close."

This Lieutenant had been flying for five or six days at variable altitudes. The case is presented to illustrate conservatism in treatment. At first the patient was treated by shrinking of the nasal mucosa and gentle use of the Eustachian catheter in the right tube. It is occasionally necessary, as in this case, to do a paracentesis; for if the middle ear contains blood or serum for any length of time which will not pass out of the Eustachian tube, it is necessary to evacuate it to prevent progressive deafness.

In considering aero-sinusitis it is quite interesting to compare the mechanics of this affection to that of Dr. Proetz' suction and pressure procedure in his displacement treatment for sinusitis. It is precisely the same.

An interesting clinical entity has been observed in patients who have been flying at high altitudes and inhaling oxygen for some time. We have recently seen one case in which the pilot showed markedly reddened drums with marked retrac-

tion. He complained considerably of fullness and pain in both ears. It improved after four or five days, during which time the nasal mucosa was shrunk twice daily. This condition has been studied by Behnke and Willmon,⁵ who believe that it is due to the absorption of oxygen remaining in the middle ear after the flight is over. This causes a marked negative pressure differential and thus a markedly retracted drum; however, the question has been raised as to whether or not the release of nitrogen from the capillaries may be a factor.

Speed and more speed is the by-word of all activity today, and in presenting this entity now, we feel that this subject is quite in step, for the conditions of aero-otitis and aero-sinusitis have come to our attention as a result of excessive speed on our leisurely constitutions.

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AMERICAN BOARD OF OTOLARYNGOLOGY.

The next examination of the American Board of Otolaryngology will be held in New York at the Waldorf-Astoria Hotel and the New York Eye and Ear Infirmary on June 3-4-5, 1943. Direct all inquiries to Dr. D. M. Lierle, Secretary-Treasurer, University Hospital, Iowa City, Iowa.

**ALLERGY IN OTOLARYNGOLOGY AND
OPHTHALMOLOGY. A REVIEW
OF THE RECENT CURRENT
LITERATURE.**

DR. FRENCH K. HANSEL, St. Louis.

During the year of 1942 comparatively few articles in the literature have been directed to the subject of allergy as related to otolaryngology and ophthalmology. In general, the articles which have been selected for review represent distinct advances in this field of medicine.

PHYSIOLOGY.

In studying the efficacy of vasoconstrictor agents in the obstructed nose, Sternstein¹ concludes that the shrinkage efficiency of a drug is diminished in proportion to the pathologic degree of erectile tissue swelling. He found that ephedrine hydrochloride in aqueous solutions is more effective than cocaine hydrochloride, except when the latter is combined with ephedrine hydrochloride, in the treatment of acute infections of the upper respiratory tract, chronic hypertrophic rhinitis and polypoid conditions with associated fixed tissue changes. He also noted that the synthetic derivatives of ephedrine and its analogues, such as amphetamine (benzedrine) and neosynephrin hydrochloride, are more effective than the natural ephedrine. Of the two drugs, neosynephrin hydrochloride 0.25 per cent appears to be the more efficient vasoconstrictor agent, judged by its comparative action in the nonobstructed nose.

Proetz^{2,3} reports further observations on the use of certain aliphatic compounds as nasal vasoconstrictors. He noted that the immersion of detached specimens of nasal ciliated epithelium of the rabbit in solutions of 2-aminoheptane sulfate and 2-amino-4-methylhexane sulfate for varying periods indicates that these drugs are not deleterious to ciliary activity as applied under clinical conditions. Clinical tests embracing 264 observations indicate that both drugs are effective nasal

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vasoconstrictors. A 0.5 per cent solution of 2-aminoheptane sulfate approximates in its clinical potency a 2 per cent solution of ephedrine sulfate and 0.12 per cent solution of 2-amino-4-methylhexane sulfate approximates in its clinical potency 0.5 per cent solution of 2-aminoheptane sulfate. He further states that a 0.2 per cent solution of either drug introduced into the sinuses by the displacement method is effective and well tolerated. Absorption of these drugs by the nasal mucosa is slow, the effect is prolonged and a rise in blood pressure does not occur after the nasal application or oral ingestion. No other systemic effect or after-effect has been obtained.

Jackson⁴ presents a very comprehensive report of experimental and clinical observations regarding the physiology and pharmacology of the nose. Kymographic illustrations show the effect of a great variety of drugs on the intranasal air volume, the blood pressure and the respiration. The drugs used in the experiment consisted of adrenalin, nicotine, sodium nitrite, ether, nembutal, histamine, yohimbine, octin, lobelin, benzedrine, neosynephrine, paredrinol and propadrine.

Bronner,^{5,6} reports his observations on the presence and action of lysozyme in the nasal mucosa. He states that in addition to the mechanical action of the ciliated epithelium and the drainage, lysozyme can be considered a factor in the mechanism of local tissue resistance. He found that lysozyme disappeared or decreased notably during the first two to four days of a common cold. At that time *M. lysodeikticus*, sarcinas of other types or spore-bearing rods which were easily dissolved by secretion from healthy noses were cultivated from the nasal mucosa or from the mucus. These organisms evidently could not be found in the nose if lysozyme was present. He further states that this lack of lysozyme in a running nose holds true only for the common cold. The discharge from the running nose of hay fever patients shows a high lysozyme content. Reasons that the absence could not be considered as proof of a causal connection between the common cold and lysozymes were discussed.

Frank, Bland and Howell⁷ report their observations on experimental hypersensitivity of mucous membranes of the upper respiratory tract. They found that the mucous mem-

branes can be sensitized via many portals, including other mucous membranes. They noted that foreign substances introduced into the nasal sinus, without injury to the mucous membranes, sensitized distant areas such as the skin and other mucous membranes.

PATHOLOGY.

Lindsay⁸ has shown that nonsecreting cysts of the antrum are capable of producing a variety of symptoms such as fatigue, irritability, headaches, low-grade fever, mild dizziness, and pains in the joints. An X-ray examination is necessary to determine their presence. The cyst fluid is usually sterile in all ordinary culture media. Chemical analysis has shown that the cyst fluid must be classed as an exudate. He states that this fact suggests that these cysts are not caused by allergic reaction of the mucosa, since in all allergic reactions the resulting edema is a transudate and reversible.

Brunner⁹ presents a very comprehensive study of the various types of glands in the nasal epithelium. He states that the hyperactivity concerns chiefly the mucous glands and may lead to exhaustion, rupture of the gland, or formation of cysts, or eventually to atrophy. He points out that the cysts may originate in the gland tubules, the excretory tubes, or in the crypts. The first evidence of the effect exerted on the glands by the edema of nasal polyps is the complete or almost complete cessation of the production of mucus in the epithelium, as well as in the glands. Purulent as well as hyperplastic inflammation of the nasal mucous membrane leads to atrophy and necrosis of the nasal glands; the first by toxins and the second by dysfunction of the glands. He also points out that the same dysfunction of glands has been found by other investigators in the bronchial mucous membrane of patients who succumbed to bronchial asthma and in the salivary glands after dissection of the secretory nerves.

ALLERGY OF THE LARYNX.

Floyd, Pembleton and Vinson¹⁰ report a case of paralysis of the left recurrent laryngeal nerve following the subcutaneous injection of antitetanic serum. The patient was a man, 24 years of age, who had been given 1,500 units of anti-

tetanus serum after a lacerating injury of the hand. The skin test for sensitivity to the serum had been negative, but eight days later serum sickness developed, complicated by paralysis of the brachial plexus and of the recurrent laryngeal nerve on the left side. Examination of the larynx showed a complete paralysis of the left vocal cord. The paralysis gradually cleared up as the general symptoms subsided. The larynx was normal six months after the onset.

BRONCHOSCOPY.

Farinas¹¹ describes a method for studying the condition of the mucosa of the respiratory tract by vaporization of an opaque medium (Merck's 40 per cent solution of neiodipin), employing an atomizer introduced behind the epiglottis with the aid of a laryngeal mirror. Radiograms are made immediately after the introduction of the opaque medium. Only 5 cc. of the solution are used for examination of the larynx and upper trachea. For the lower trachea and bronchi, about 15 cc. should be employed. By this method the normal structures of the larynx may be demonstrated in both lateral and sagittal films. The outlines of the trachea and bronchi are clearly shown by thin dense lines, contrasting with the air in the lumen. A tumor in the trachea may be outlined by the opaque medium. If there is an infiltrating process in the larger bronchi, an alteration in the contour indicates its presence even if the calibre of the bronchial lumen is not reduced. A lesion of this type is not demonstrated by the usual method of bronchography. This method of introducing the opaque medium is well tolerated by the patient.

The physical and chemical properties of sputum and the factors determining variations in portions from different parts of the tracheabronchial tree were studied by Basch, Holinger and Poncher.^{12,13} It was noted that sputum from the most dependent parts of the bronchi had an extremely high viscosity and could be obtained only by bronchoscopic aspiration. The secretion at a higher level was considered the secretion from below, liquefied and with a lower solid content. On top of this secretion after a rest period there was found a plug with moderately high viscosity. The various factors which influenced the character of the secretions were selective secretion, selective resorption, the speed of movement of

secretion from one level to another, and bacterial action. The investigators also studied the influence of the commonly used expectorant drugs, oxygen, steam and carbon dioxide in the sputum in different areas of the trachea and bronchi and on the mucous membranes. Ammonium chloride, potassium iodide, fluid extracts of senega and ipecac and emetine hydrochloride liquefied the sputum in the upper bronchi but did not influence the material in the peripheral bronchi. Steam inhalations in an atmosphere at 70° to 75° F. of 80 to 90 per cent relative humidity liquefied the secretions throughout. Carbon dioxide inhalations liquefied secretions and stimulated resorption. Thus carbon dioxide and steam may be considered as extremely efficient expectorants. Oxygen, on the other hand, unless humidified or diluted with 10 per cent carbon dioxide, thickened the secretion, as did atropine sulfate and codeine; and consequently oxygen must be considered as an antiexpectorant when administered in the treatment of respiratory obstruction complicated by pulmonary suppuration.

Bases and Kurtin¹⁴ emphasize the value of bronchoscopy in the prevention of death in status asthmaticus. They report that six of the seven patients who died of status asthmaticus at the Mount Sinai Hospital and on whom autopsy was performed in the past 15 years died from blocking of the tracheobronchial airway by excessive outpouring of secretion. They reviewed the literature on death in asthma and point out the frequency with which it was noted that obstruction of the tracheobronchial tree with secretion was present. They gave a case report of an instance in which bronchoscopic aspiration was a lifesaving procedure. They conclude by saying that the most important factor in causing death in status asthmaticus is obstruction of the tracheobronchial tree by viscid secretion. They point out that this material can be removed by suction through a bronchoscope. They strongly advise the use of this procedure in those cases of status asthmaticus in which other measures have proved unsuccessful.

Prickman, Maytum and Moersch¹⁵ reported three interesting cases of primary carcinoma of the bronchus occurring in asthmatics and emphasize the importance of recognition in these cases. The most common symptoms consist of cough, hemoptysis and expectoration. The sputum is first mucoid and later becomes purulent. Retention of secretions may

cause attacks of chills and fever. Not infrequently physical and Roentgenologic evidence of bronchitis, stenosis or even atelectasis may be found. The types of malignant processes are usually squamous cell carcinomas or adenocarcinomas.

The three cases presented emphasize the importance of making a careful and complete examination of all patients with asthma and the necessity for bronchoscopy in certain cases if the correct diagnosis is to be made. Recurring hemoptysis in asthmatics always suggests the possibility of neoplasm or other organic pulmonary disease.

In all patients with the symptoms of asthma a cytologic examination should be made of the bronchial secretions. The persistent absence of eosinophiles should indicate some process other than allergy. On the other hand, as has been emphasized above, it is well to bear in mind that patients with allergic asthma may have other pathologic conditions in the bronchi and lungs.

GENERAL CONSIDERATIONS AND TREATMENT.

Kuhn and Linton,¹⁶ in a review of 3,657 consecutive cases in eye, ear, nose and throat practice, noted that 20 per cent of the cases had nasal complaints. A review of this 20 per cent, or 720 nasal cases, showed 140 allergic nasal cases, or 19.4 per cent. Other than allergic nasal cases there were 580, or 80.6 per cent. The allergic nasal cases constitute 3.7 per cent of all those reviewed. From their observations they concluded that the frequency of allergy as a complicating factor in otolaryngology should be appreciated. It is emphasized that the search for eosinophiles is not reliable unless the search is continued over a period of time in some cases. Allergic investigation and management is an important therapeutic adjunct to surgical and medical management.

In a review of the recent advances in otolaryngologic allergy, Hansel¹⁷ abstracts the important points from 73 articles selected from a group of about 300. Emphasis was placed upon the recognition of allergy of the parotid and submaxillary glands. This condition is not uncommonly noted in children and may be confused with other types of salivary gland involvement. Papers were reviewed on the following subjects: Allergy of the mouth, the oropharynx, the esophagus

and the larynx, the auditory nerve, allergy and sinusitis in children, allergy in relation to chronic sinusitis, bronchoscopy in asthma, the sinuses in asthma, the pathology and finally the bacteriology of sinusitis.

Jaffe¹⁸ reports his observations on vasomotor rhinitis in the tropics. He found that the condition is quite common in this climate. There was a great deal of dust, especially in the cities, and it was felt that this was a factor in the cause of the trouble. No atmospheric studies were made in regard to pollens or mold spores. No skin tests or allergic management were instituted. The patients were treated by cauterization of the mucous membrane with a concentrated solution of trichloroacetic acid. The author warns against unnecessary operations. He suggests methods of conservative therapy which he has found to be satisfactory.

Gelfand¹⁹ presents his observations on the allergic aspect of vasomotor rhinitis with particular reference to etiology, diagnosis and treatment. He emphasizes the importance of a complete clinical history, supplemented by continued clinical observation. He reviews the various occupational contacts which play an important part in the etiology. An analysis is presented of a limited series of 52 cases in which 22 different substances were incriminated. Most of these were inhalants and a large proportion were met with in the patient's occupation. Food allergy accounted for a small percentage of the cases.

Farmer and Kaufman²⁰ present further observations on the use of histamine in the treatment of nasal allergy. Both seasonal and nonseasonal types were treated. The histamine was given by subcutaneous injection, the initial dose being about 0.01 to 0.1 gamma. The highest dose in perennial rhinitis was 100 gamma. The effectiveness of small doses was emphasized. Injections were increased each time by 50 per cent if well tolerated. In the beginning they were given two to three times a week. Later they were spaced at approximately 5-, 7-, 10-, 14- and 20-day intervals. It was also emphasized that doses must be individualized. Among 41 cases of perennial rhinitis, the result was good in 25, fair in 10 and poor in six. Among 15 of the 41 severe cases, however, 10 had a good result. In the treatment of uncomplicated

cases of tree, grass and ragweed hay fever, injections were started 10 weeks before the onset of the season. During the first month the injections were given twice a week, thereafter once a week and continued at this interval until the end of the season. The initial dose in this group was 1 gamma. If the injections were well tolerated, subsequent doses were 2, 4, 8, 15, 30, 50 and 75 gamma. These eight doses were given during the first month of treatment at about four-day intervals. The ninth to the fourteenth doses were 100 gamma each, and were given at an interval of one week. At the beginning of the pollinating season the dose was reduced to 30 gamma and, if well tolerated, continued with this amount at weekly intervals to the end of the pollinating season. Among 72 ragweed cases, of which 24 were considered severe, seven had good results and nine fair results. Among 48 cases of ragweed considered as moderate, 19 had good results and 13 fair. Among 15 cases of grass hayfever, four were severe and 11 moderate. Nine had a good result and six fair. The same satisfactory results were obtained in tree pollinosis.

Cohen²¹ presents his observations and experiences in the preparation and use of vaccines in the treatment of sinusitis. He states that when sinusitis develops in allergic persons, the secondary effects frequently take the form of bacterial allergy, with asthma and allergic rhinitis as the prominent manifestations. He further states that vaccine therapy may be of no benefit in persons with chronic sinusitis when there is supuration in a sinus that is not draining or that drains poorly, or when the sinusitis is secondary to an untreated primary focus of infection, such as diseased tonsils. The observations in this paper were confined entirely to vaccine therapy. Nothing was said about the management of the allergic cases from the standpoint of pollen, food or inhalant allergy.

In a review of published statistics on the results of Roentgen therapy in chronic paranasal sinusitis, Butler and Woolley²² report that 33 per cent of patients were cured and 41 per cent definitely improved by treatment. In their 11 years of experience with Roentgen therapy of chronic sinusitis they have never seen any harmful results. The best results were obtained in those cases in which Roentgenograms show a marked thickening of the sinus membrane with a small cen-

tral pneumatized cavity. No distinction was made between those cases of chronic sinusitis due to infection and those due to allergy.

ALLERGY AND THE EARS.

In studying the incidence of allergy in biologic deafness and pathologic deafness, Mao²³ concludes that in the pathologically deafened children, with their equally high incidence of allergic manifestation, it may be assumed that the hereditary factor of allergy renders them constitutionally more susceptible to the influences of various contagious and infectious diseases. He believes that definite evidence has been offered to indicate a higher percentage of allergic reactions in deafened children than in children with normal hearing. Allergy has been shown to be a hereditary disease in a high percentage of children so afflicted. He finally concludes that it is not unreasonable to assume that allergy and deafness have some mutual hereditary background.

In the treatment of Ménière's syndrome, Atkinson²⁴ emphasizes the importance of the accuracy of diagnosis. A neurological examination should be performed in every case. His observations were confined mostly to the study of cases of sensitivity and nonsensitivity to histamine. Among 14 patients sensitive to histamine there was a relief of attacks in 12. Forty-nine cases of insensitivity to histamine were analyzed. Relief was obtained in 20; improvement occurred in 25; there was a relapse of the condition in four. The patients who were nonsensitive to histamine were treated by the intramuscular injection or oral administration of nicotinic acid. He noted that the histamine sensitive patients did not respond to nicotinic acid therapy.

OCULAR ALLERGY.

In a brief review of the literature on vernal conjunctivitis, Eber²⁵ calls attention to some of the most outstanding observations on this subject. He concludes, however, that vernal conjunctivitis is still a disease of unknown etiology in spite of the fact that there is definite evidence that it has the characteristics of an atopic disease.

It has been our experience that true vernal conjunctivitis is rarely associated with other manifestations of allergy.

Conversely, allergic conjunctivitis associated with other manifestations of allergy, particularly the nasal type, does not conform to the classical vernal conjunctivitis.

In a series of 47 consecutive cases of vernal catarrh, Knapp²⁶ treated 43 with vitamin D in the form of viosterol and calcium in mineral mixture tablets. The various types of vernal catarrh were represented. Forty-two of the 43 patients showed definite improvement. In 25 cases this type of treatment was superior to that of several other accepted therapeutic procedures. The results obtained in vernal catarrh suggest a disturbance of the vitamin D-calcium-phosphorus metabolism.

De Veer²⁷ reports his observations on a type of intraocular inflammatory reaction that occasionally follows accidental, surgical or spontaneous rupture of the crystalline lens. He noted that clinical reactions to lens substance occurred among 8 per cent of the patients who showed positive reactions to intracutaneous injections of lens antigen. He suggests that routine tests be performed on all subjects who are to undergo cataract operations or on those with a previous history of lens injury. In these cases desensitization with the antigen, augmented by staphylococcal toxins, is indicated. It is suggested that prevention of phacoanaphylactic reactions through desensitization will result in reduction of the incidence of sympathetic ophthalmia, especially of that incident to cataract extraction.

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IN MEMORIAM

JOHN FINCH BARNHILL, M.D.,

1865-1943.

Dr. John F. Barnhill, widely known otolaryngologist, died at his home in Miami Beach, Fla., March 10, at the age of 78 years.

Dr. Barnhill was born at Flora, Ill., and received an M.D. and an LL.D. degree from Central College of Physicians and Surgeons in Indianapolis, where he made his home and practiced his profession for many years. He also studied at the New York Eye and Ear Infirmary, Central (London) Ear, Nose and Throat Hospital and the Universities of Vienna and Berlin. In 1929 he was honored with the degree of LL.D. from Indiana University School of Medicine, where he was Professor of Surgery of the Head and Neck.

Dr. Barnhill was a Fellow of the American College of Surgeons; he was President of the American Laryngological, Rhinological and Otological Society in 1927; of the American Academy of Ophthalmology and Otolaryngology in 1931-1932, and of the American Laryngological Association in 1938. He was Chairman of the Section on Otolaryngology of the American Medical Association in 1904.

He was the author of several medical books in his specialty and also of "Not Speaking of Operations" and "Hatching the American Eagle," the latter a narrative of the American Revolution.

After a long and active professional life in Indianapolis, Dr. Barnhill removed to the sunny South, where he could indulge his love of gardening through the entire year. He broke away from his seclusion annually to attend the meetings of the special societies, where he enjoyed the reunion and exchange of ideas with his colleagues.

A quiet, retiring, modest yet genial person, he delved deeply into any subject that interested him and these were diverse and many.

He leaves his widow, Mrs. Celeste Barnhill, of Miami Beach, and two brothers, Joseph K. and Dr. Charles A. Barnhill, of Indianapolis, to whom we extend sincere sympathy.

WAR CONFERENCE.

The medical, surgical and industrial hygiene experts who are so ably safeguarding the well-being of more than 20,000,000 industrial workers have agreed to pool their knowledge and exchange their experiences regarding the many new and complex problems of today's wartime production. For this purpose their organizations —

The American Association of Industrial Physicians and Surgeons,

The American Industrial Hygiene Association, and

The National Conference of Governmental Hygienists — are combining their annual meetings in a four-day "War Conference" at Rochester, N. Y., May 24-27, 1943. Among the problems to be discussed from a practical standpoint are:

The mass entry of women into industry;

Older-age employees, with their various associated problems; proper placement and employability considerations of the 4-F rejectees;

Rehabilitation and proper employment of those already discharged from the military services because of disabling conditions;

Toxic and other hazards from new substances, new processes, and the use of substitute materials;

Absenteeism; fatigue; nutrition;

Effects of long hours; double shifts; two-job workers; overtime; increased industrial accident rates;

Advances in the treatment of illnesses and injuries, and many others.

This joint meeting will be a report on the state of the nation, by the men who know, in matters of industrial health. Dr. William A. Sawyer, Medical Director of Eastman Kodak, is General Chairman; Dr. James H. Sterner and Lieut.-Cmdr. J. J. Bloomfield are arranging the programs for the industrial hygienists.

Physicians and surgeons, hygienists, engineers, nurses, executives — all who are interested in the problem of industrial health and their solution — are invited to attend as many of the sessions as they can arrange for; no registration fee is required.

